...ining of
...OL S... ELS
PAGE

...roduction
...lotors to
...rances
PAGE 73

...s Scr... Machines
... Precision Work
PAGE 86

...chining Methods for
CLEAR PLASTICS
PAGE 104

The
TOOL ENGINEER

HARDINGE Precision Collets
for all makes of Lathes and Milling Machines

When ordering collets only, or when ordering collets with lathes or milling machines of any make or size, specify HARDINGE Precision Collets . . . they cost no more than other collets.
Write for bulletin No. 41.

...RFORMANCE HAS ESTABLISHED LEADERSHIP FOR

HARDINGE
ELMIRA, N.Y.

...UBLISHED BY THE BRAMSON PUBLISHING COMPANY

What you want to Know about ANPT Pipe Thread Gages

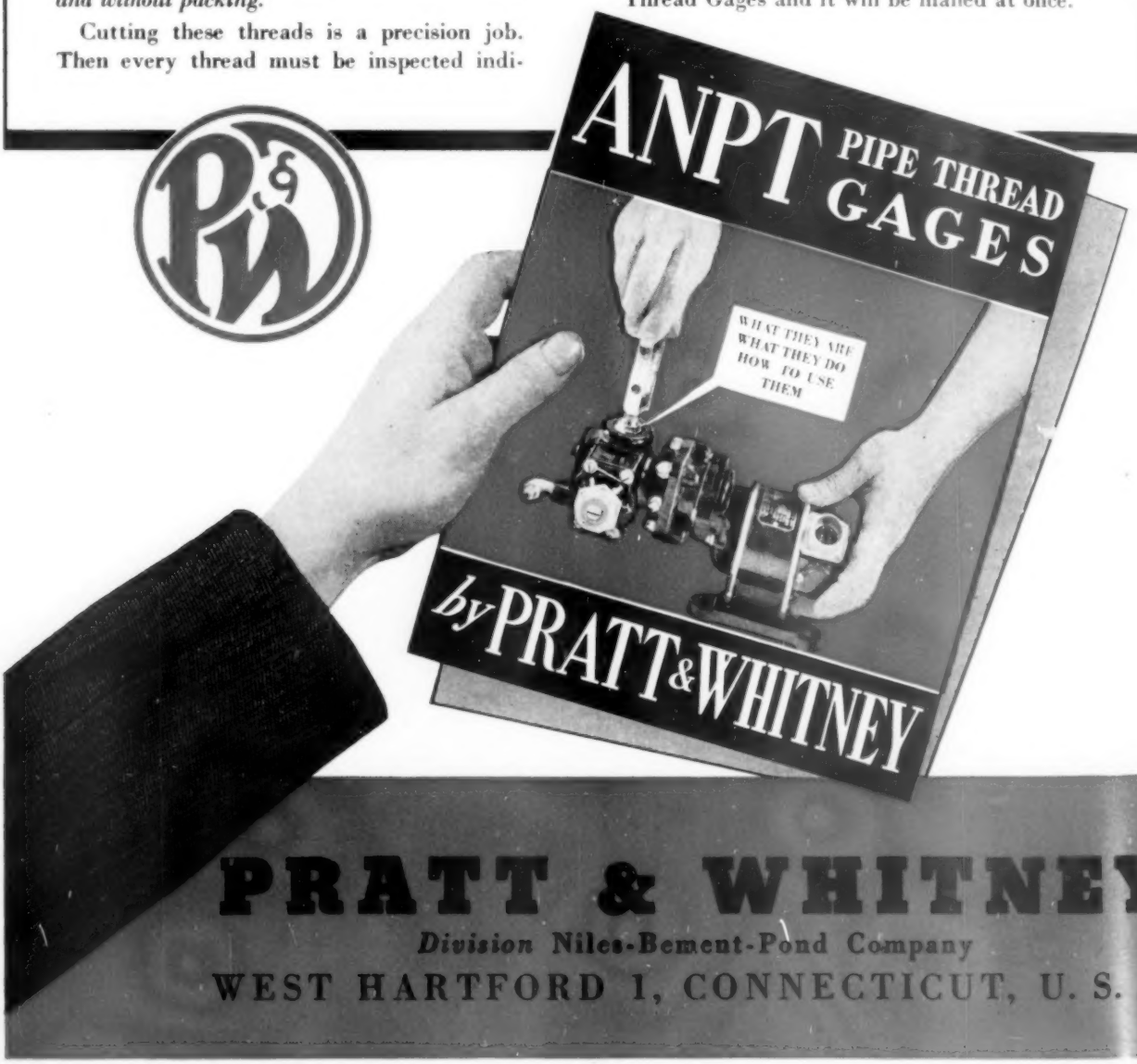
***What they are . . . What they do . . . how to use them. You'll find everything* in quick, complete, workable detail in this new P&W Booklet!**

American war planes have demonstrated beyond question their ability to absorb heavy punishment and still fly. One reason is the excellence of the threads in the aircraft pipe fittings that carry vital gas and oil. Army and Navy specifications for these threads are necessarily rigid. They must hold tight, never leak, never shake loose under vibration . . . *and without packing.*

Cutting these threads is a precision job. Then every thread must be inspected individually to make sure beyond any doubt that it will assemble *correctly* either here at home or on far distant flying fields. The lives of our American pilots depend on this inspection.

The new Pratt & Whitney ANPT (Army Navy Pipe Thread) Gages provide this quick and positive inspection . . . tell almost at a glance if a thread meets the rigid government specifications or should be discarded.

It's an important subject . . . complex to understand. But we have covered it fully in a form easy to grasp in this new Pratt & Whitney booklet just off the press. Simply write on your own company letterhead for a copy of our booklet on ANPT Pipe Thread Gages and it will be mailed at once.



PRATT & WHITNEY

Division Niles-Bement-Pond Company

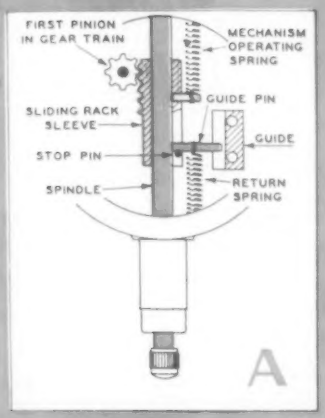
WEST HARTFORD 1, CONNECTICUT, U. S. A.

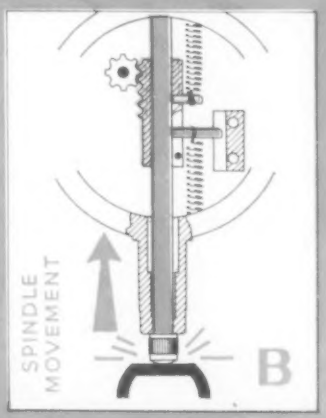
STANDARD

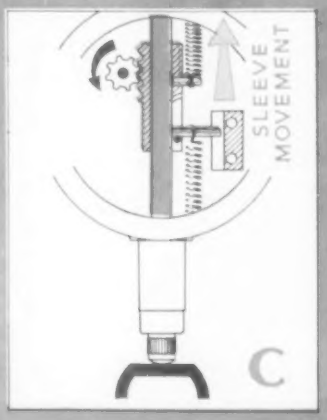
SHOCKPROOF *Dial Indicators*

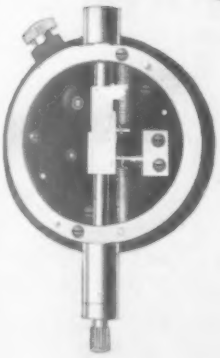
Here's How The SHOCKPROOF Action Protects the Precision Mechanism

22 MILLION BLOWS, struck deliberately on a stock gage, failed to damage gear teeth, bearings or spindle, or impair the instrument's accuracy.









Rear view of SHOCKPROOF Dial Indicator, cover removed, showing "Free Wheeling" mechanism.

A — Rest Position

B — Sudden blow or contact by work piece raises spindle. For an instant guide pin moves away from contact with stop pin. This allows mechanism operating spring to raise the rack sleeve which is slidable on the spindle.

C — Stop pin and guide pin resume contact after the mechanism operating spring has actuated the gearing. Relative position of spindle and rack sleeve is restored.

In actual use only the more sudden shocks against the contact point jar the spindle ahead of the rack sleeve. For normally applied contacts the sleeve and spindle move together as a unit. In any case the force on the mechanism is never any greater than the pull of the spring.

WRITE FOR COMPLETE CATALOG

ARMY (E) NAVY

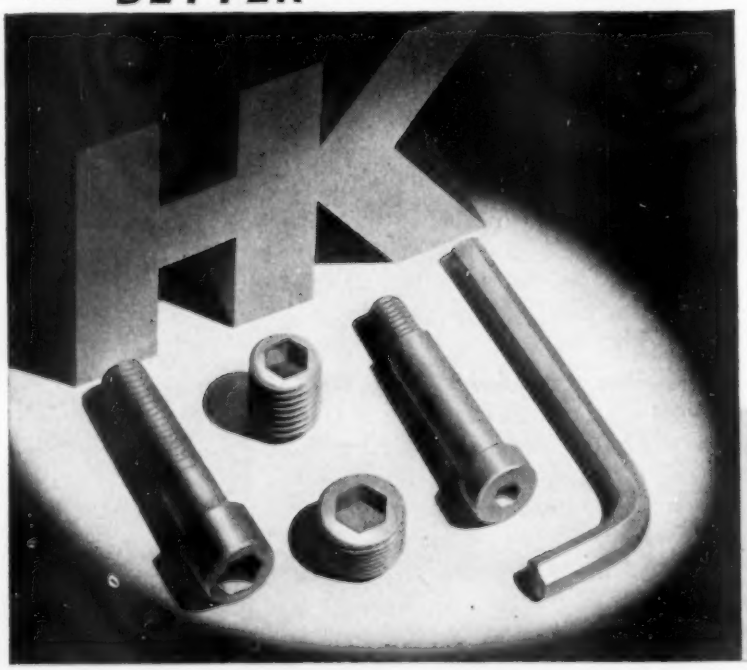
STANDARD GAGE CO., Inc., Poughkeepsie, N.Y.

HOLO-KROME *fibro forged* SOCKET SCREWS

THE *BETTER* FASTENING METHOD

Assembly Time Reduced!

One of the many advantages gained by using Holo-Krome FIBRO FORGED Socket Screws with the Internal Wrenching feature. The Hex. Key engages the socket quickly. Permits a positive tightening job ... More compact design in parts, machinery and machine tools, materials used efficiently, space used to full usefullness and again, Assembly Time Reduced! ..... It's the Holo-Krome Internal Wrenching feature.



PRECISION MADE
TO EXACTING STANDARDS

SOCKET HEAD CAP SCREWS...SOCKET SET SCREWS . . . SOCKET PIPE PLUGS SOCKET HEAD STRIPPER BOLTS... SOCKET SCREW KEYS & KEY SETS

GUARANTEED UNFAILING PERFORMANCE

The **HOLO-KROME**
SCREW CORPORATION
Main Offices & Plant
HARTFORD 10, CONN., U. S. A.

STANDARD GAGE CO., Inc., Poughkeepsie, N.Y.

VOLUME XIV AUGUST, 1944 NUMBER 2

THE TOOL ENGINEER

T.M. REG. BY AMERICAN SOCIETY TOOL ENGINEERS

THE BRAMSON PUBLISHING COMPANY
2842 W. GRAND BOULEVARD DETROIT 2, MICHIGAN
ROY T. BRAMSON, BUSINESS MANAGER R. G. BRAMSON, BUSINESS MANAGER J. M. KAMBERG, CIRCULATION MANAGER

ROY T. BRAMSON, Publisher
ANDREW E. RYLANDER, Technical Editor
WALLACE A. SCOTTEN, JEROME S. WILFORD
Associate Editors
RALPH E. DAVIS, Presentation Editor

TECHNICAL FEATURES

Machining Tool Steels at High Speeds 67
Precision Coining on the Punch Press 71
STREAMLINED PRODUCTION:
Product Re-Design Introduces New Methods 73
Oil Field Shops Demand Top Tooling 81
Time and Tool Savers 84
Manufacturing Small Parts to High Accuracy 86
MACHINING MAGNESIUM:
Part II: Recommended Methods for 10 Operations 91
Production Data Sheet 97
The Crib 98
Heavy Surface Grinding for Precision 99

MEN, MATERIALS AND MACHINES

PRODUCTION Round-Table:
Engineers Foresee Cost Reduction as
Major Machine Tool Requirement 101
Machining Clear Plastics 104

DEPARTMENTS AND SPECIAL FEATURES

Production Perspectives ... 65
Capital Communique 109
Machine Tool News 112
Industrial News Digest 115
Greenie—cartoon feature ...115
Motor Memos 132
New Equipment 162
New Literature 186
Handy Andy Says 194
A.S.T.E. Doings 200
Passing Parade 216

Classified Advertising 224
Advertisers' Index 226

ADVERTISING OFFICES

Chicago 2, Illinois
Dwight H. Early
100 N. LaSalle St.
CENtral 2184

New York 17, N. Y.
A. M. Willcox
420 Lexington Ave.
Lexington 2-4816

Los Angeles 14, Calif.
Walker & Minton
403 W. Eighth St.
VAndike 9348

Detroit 2, Michigan
Thomas J. Orlando
2842 W. Grand Blvd.
MAdison 4077

Publisher's Letter

BACK home in Detroit, after three months of almost constant traveling, I have a chance now to catch up on war news and listen to my favorite news casts — something missed on trains and in hotels.

Thinking back over many things I saw and heard in plants in relation to military progress, I'm reminded of a short article I wrote nearly twenty years ago entitled "Ideas Are the Biggest Things in Business."

•

Now, the truth of the words in that title are more meaningful than they ever were. Ideas are making successful the biggest "business" America has yet engaged in—the business of winning this war. Our boys and their allies on the fighting fronts have superior weapons with which to deliver the final blows to a groggy enemy. They were made exceedingly well and delivered on time largely because "know-how" was passed along to production men who read the trade press.

Through business journals, like this one, ideas have been passed along from one plant to another—better methods, quicker ways of doing the same jobs and cost-saving processes have been given currency.

•

A glance through the last three or four issues of our publication reveals such examples as: Gage Control Cuts Production Costs, Tooling to Increase Production, Machining Magnesium, Manufacturing for Interchangeability. High-Speed Milling, Tooling Up for 3000 Jobs a Month, Milling with Fly-Cutters, Unusual Jobs on the Horizontal Boring Mill, Jig Boring at Full Capacity.

These and many others should prove the point that ideas and "know-how" are the chief stock-in-trade of successful business papers, and the role they have played in the winning of this war.

To give you these ideas we must travel extensively and be constantly on the alert for inklings of what your needs are, where ideas for suitable "copy" are obtainable or are likely to be found at some future date.

There is no scarcity of good ideas. Our readers have these ideas, we gather the best of them, develop them for your application. It's a real pleasure—and we fully intend to continue for a long, long time to anticipate your wants.

•

We want to thank the great many of you who have been kind enough to take time from your busy days to write us your ideas for discussion in our PRODUCTION **Round-Tables**. We're trying to answer all of you—some replies may be delayed—but we, too, are short on manpower.

Cordially yours,

Roy T. Bramson

• Published the first Thursday of each month, by The Bramson Publishing Company. Advertising, Editorial, and General offices at 2842 West Grand Boulevard, Detroit 2, Michigan. Telephone: MAdison 4077.

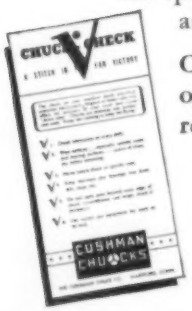
• Acceptance under the Act of June 5, 1934, at St. Joseph, Michigan, authorized December 18, 1940. Printed in the U. S. of A. Copyright, 1944, by The Bramson Publishing Company. Member: Controlled Circulation Audit, Inc.

Stop and think...

WHEN YOU USE THAT wrench!

● A wrench is a good symbol for industry today. We've got our enemies where we can really begin to apply the squeeze. But when a machine tool operator puts the wrench to his chucks he should not only think of the direct contribution he is making to Victory but should also bear in mind that the chucking equipment he is operating must be carefully conserved and maintained as a vital part of our war production facilities.

We build a high degree of precision into Cushman Chucks and they are capable of rendering long, trouble-free service. But, like any other fine tools, they require careful handling and intelligent maintenance. They should be selected, in the first place, for the specific job they are to perform. They should be regularly lubricated, kept clean and not subjected to overload or abuse.

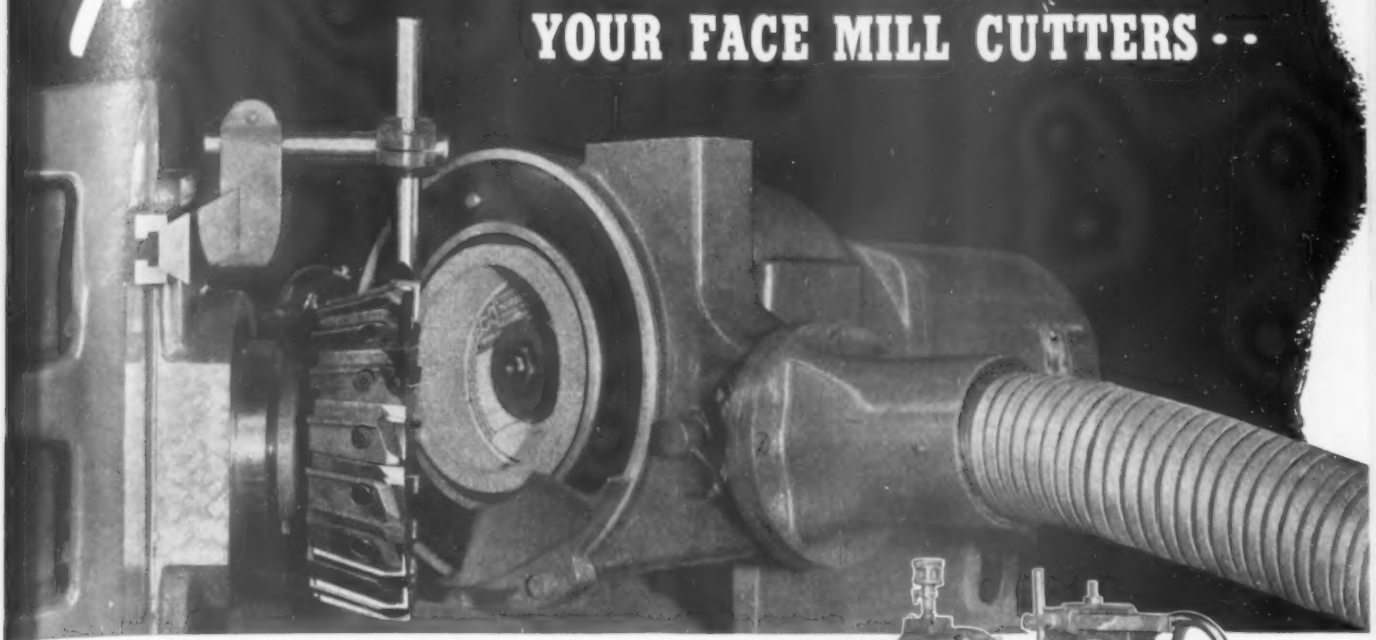


Cushman Chuck Check Cards . . . available free to you for distribution to your operators . . . will help you conserve these important tools, prevent delays and reduce spoilage. Write to The Cushman Chuck Co., Hartford 1, Conn., U. S. A.

A WORLD STANDARD FOR PRECISION

CUSHMAN CHUCKS

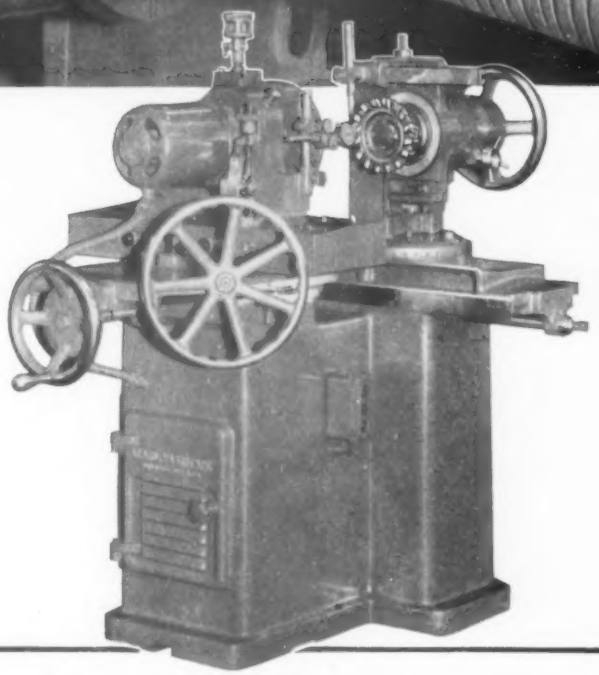
Increase PRODUCTIVE TIME BETWEEN GRINDS ON YOUR FACE MILL CUTTERS··



...Assure a Greater Return From Your Milling Machine Investment

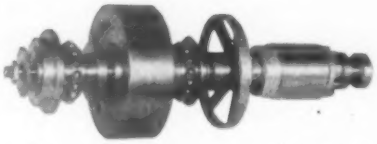
Avoid waste of valuable productive time by constant changing of face mill cutters. The Milwaukee Face Mill Grinder sharpens each tooth accurately — makes cutters last longer — require less frequent regrinding — decreases "down-time" on your milling machines.

An indispensable machine of strength, precision and capacity, the Milwaukee Grinder grinds Tungsten Carbide and other cutters, ranging from 3 inch to 16 inch diameters, to within .0002 runout — and does it fast.



MILWAUKEE FACE MILL GRINDER FEATURES:

- Unusual Rigidity
- Accuracy to within .0002 runout
- Finger-tip controls — handily located for simplified operation
- Design and performance of the Milwaukee substantially reduces sharpening time
- The three-bearing dynamically balanced grinding wheel spindle rotates at 3400 r.p.m.; heavy flywheel keeps abrasive wheel up to full grinding speed—maintains accurate uniform cutting action — each tooth perfectly ground.



- Set-ups quickly made with graduated dial, facilitating quick adjustments

For complete information write for Bulletin 41-A

Rotary Head Milling Machine
•
Automatic Jig Borers
•
Center Scope

Kearney & Trecker *Products*
CORPORATION
Milwaukee, Wisconsin
Subsidiary of Kearney & Trecker Corporation

Milwaukee Face Mill Grinder
•
Milwaukee Midgetmill
•
Milwaukee Speedmill

NEWS for ✓Production Men ✓Heat Treating Men ✓Metallurgists

THIS NEW *Free* 40-PAGE BOOK SHOWS

HOW INDUSTRIAL USERS ARE PROFITABLY APPLYING Deepfreeze

Sub-zero Temperatures FOR...

HARDENING • STABILIZING • SHRINKING • TESTING OF METALS

Actual Experiences Point the Way to Effective Use of Cold Treatment

in Your shop

Sub-zero treatment of metals is being employed in more industrial applications every day. Men who aren't already using this effective process have read about the excellent results it is producing in many fields. Everyone wants last-minute information and discoveries about cold treatment—its effect on metals, fields where it is practical, procedures for treating different metals, etc.

To bring you the latest authentic cold treating practices and data, Deepfreeze has just completed a 40-page booklet that is filled with valuable information for every man working with metals.

This new FREE book explains what actually occurs when metal is subjected to chilling, and how the changes that take place are adaptable to a wide range of industrial applications.

You'll find the complete story on hardening, stabilization, shrinking and testing of metals and other materials. Three distinct methods of cold treating procedure are described in detail for use in different types of applications. Metallurgists, production men and other Deepfreeze users have contributed the results of their experiences—results that show how you can obtain the advantages of cold treating in your plant.

Cold treating is on the move. Progress has been made so rapidly that yesterday's literature no longer tells the complete story. To bring your organization up-to-date on this vitally important subject, order free copies of "Cold Treating Practice" for your key men. The coupon below is for your convenience.

Here's a sample of how this book can help you...

These typical pages from "Cold Treating Practice" give some idea of how this valuable book can help you in your work every day. Applications similar to your own are described in detail. Even if you are now cold treating, the many new discoveries will show you if you are using this process to full advantage. Among the many timely subjects included are the following:

	See Pages
Hardening cutting tools to a degree not obtainable with heat treating alone	12-19
Repairing broken cutters	20
Stabilization of metal parts to halt growth with age	23-26
Shrink-fit assembly that is faster and eliminates dangers of heat and press fit	27-32
Testing aircraft instruments and metal parts under sub-zero temperatures	33
Most practical chilling equipment for different types of applications	8-11
Cold treating procedures for different types of applications	14-16
Procedure for calculating the rate of production	13
Technical data and tables for cold treatment	35-37

Deepfreeze
2311 Davis Street, North Chicago, Illinois

Please send.....copies of the new 1944 Deepfreeze "Cold Treating Practice" book to:

Name.....

Title.....

Firm.....

City.....State.....

Send coupon today for your free copies

Every executive and production man concerned with the "conditioning" of metals should have a copy of this new book. Send the coupon today for the number of copies you need for your key men.

Only Motor Products Corporation can make a "Deepfreeze"

Deepfreeze

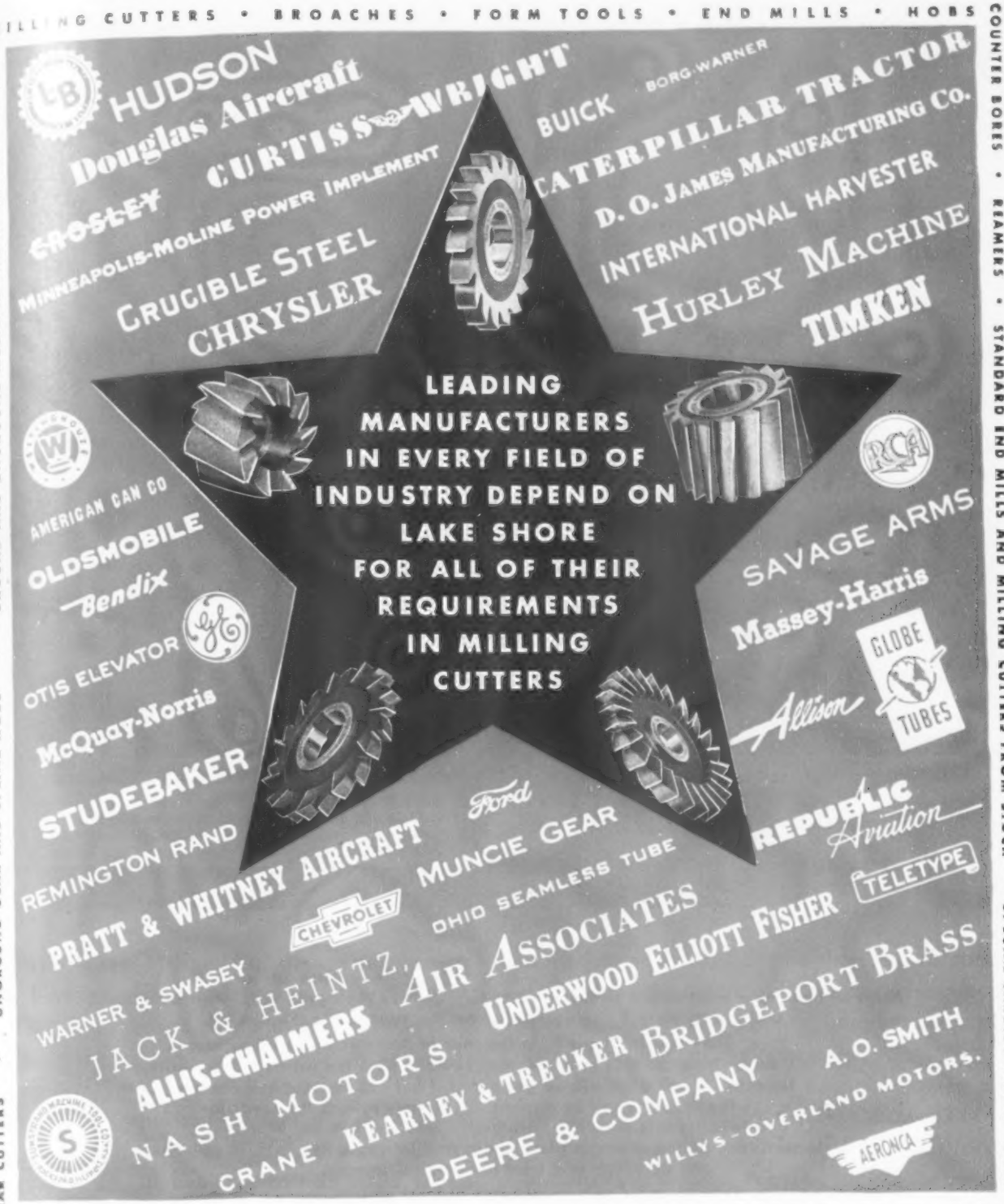
2311 DAVIS STREET
NORTH CHICAGO, ILLINOIS

TRADE MARK DEEPFREEZE REGISTERED UNITED STATES PATENT OFFICE

MILLING CUTTERS • BROACHES • FORM TOOLS • END MILLS • HOBS

COUNTER BORES • REAMERS • STANDARD END MILLS AND MILLING CUTTERS FROM STOCK • SPECIAL CARBIDE TIPPED TOOLS

GEAR CUTTERS • UNGROUND GEAR AND SPLINE HOBS • GROUND AND UNGROUND MULTIPLE THREAD MILLING CUTTERS



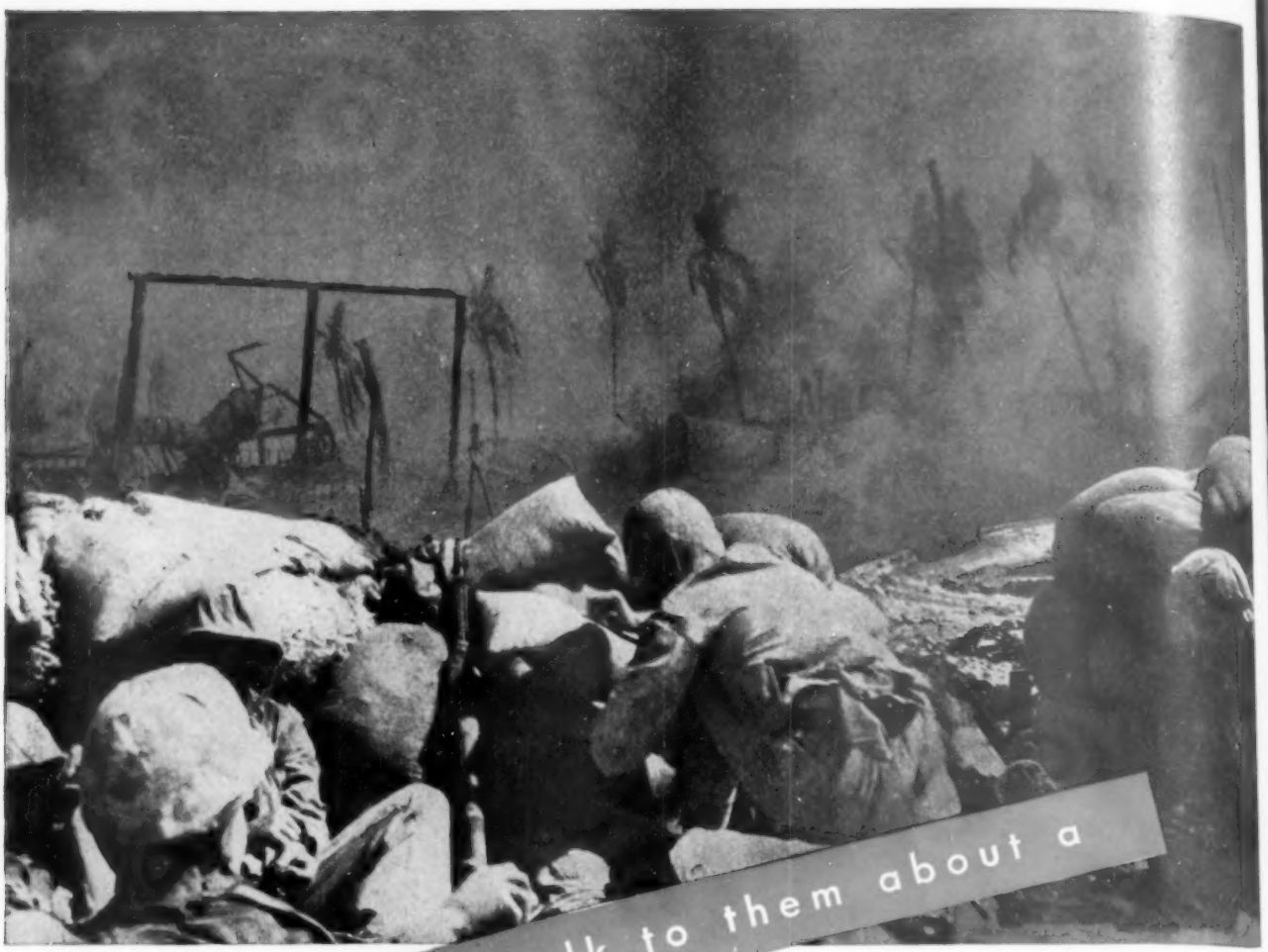
MILLING CUTTERS • BROACHES • FORM TOOLS • END MILLS • HOBS

Back of every Lake Shore Tool are the facilities and skilled personnel of one of America's most completely equipped plants.

LAKE SHORE TOOL WORKS INC.

Send us your blue prints for quotations on your high speed tool, special tool, and carbide production tool requirements.

816 NORTH KOSTNER AVENUE • CHICAGO 51, ILLINOIS



who dares to talk to them about a THIRD WORLD WAR?

They were at Tarawa.

Many of them now wear empty sleeves, or bandages where their eyes were. And a thousand and twenty-six will rise up never from the sands of Tarawa Island.

They couldn't hear it. In the roar of that tornado, as they fought and fell, so far from the hills of home, they couldn't hear the words: "*. . . history repeats . . . and what will we get out of it but . . . how the hell can we police . . . the next one will be against . . . already sowing the seeds for . . . and twenty years from now, brother . . . the Third World War . . .*"

In elevators, on the street, in plush chairs that let you down easy, in columns and editorials and from the political stump.

What is the matter with us? Can't we at home at least go into peace with some spark of their courage and determination that this war is not another mockery, not just another World War? Let no man give voice to that weak and deadly cynicism. Let him stand up and think straight and have the courage to call the lie to any man in public or private life who fails to do the same.

And let each of us do everything humanly possible to help win this war sooner . . . buy War Bonds—give blood—boycott the black market . . . and plan ahead now for a *better* America than we had before.

Today, the engineers of the machine tool industry can greatly help the post-war planners of government and business management. One of these is a Bryant man . . . We invite you to send for him.

BRYANT CHUCKING GRINDER COMPANY SPRINGFIELD, VERMONT, U. S. A.

"Gulf Cutting Oils

HAVE MATERIALLY INCREASED OUR PRODUCTION AND TOOL LIFE"—

Says this plant Superintendent

Actual photo of a Gulf Service Engineer consulting with Superintendent of aircraft parts plant. This plant has considerably improved machining practice with Gulf Lasupar Cutting Oil and Gulf Cut-Aid.

"This Gulf Service Engineer

GIVES US THE RIGHT RECOMMENDATION FOR EVERY MACHINE AND TYPE OF WORK"

THIS is one of hundreds of war plants that have secured greater production and longer tool life from the use of the proper Gulf Cutting Oil for every machine and type of work, as recommended by Gulf Service Engineers.

Here's the important reason why Gulf Cutting Oils help improve machining practice: Every Gulf Cutting Oil has specific properties which insure better performance on certain types of cutting jobs! Gulf Lasupar Cutting Oil, for example, is used to advantage by the shop shown above. This oil is manufactured by an exclusive process that secures characteristics uniquely advantageous to many cutting operations.

Call in a Gulf Service Engineer today and ask him to show you how Gulf Cutting Oils can help you improve production and tool life and obtain better finishes. For your copy of the booklet on Gulf Cutting Oils, send the coupon below.

GULF INDUSTRIAL LUBRICATION

Gulf Oil Corporation—Gulf Refining Company TE
3800 Gulf Building, Pittsburgh 30, Pa.
Please send me, without obligation, a copy of the booklet, "Gulf Cutting Oils," which includes a 45-page Machining Guide.

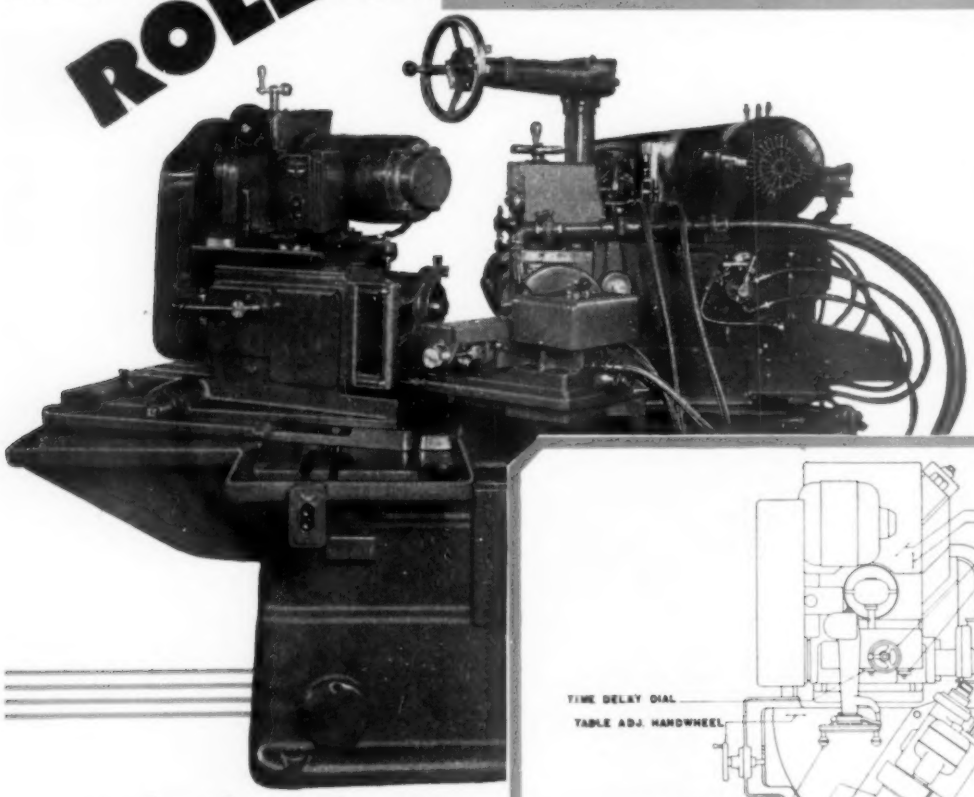
Company_____

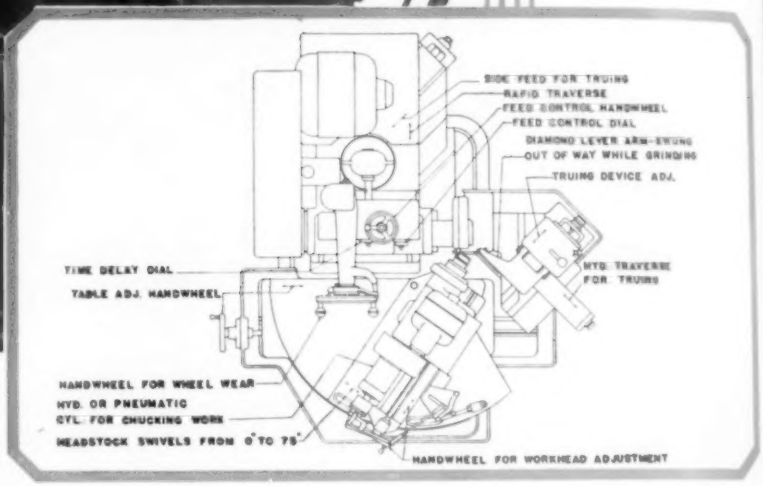
Name_____

Title_____

Address_____

GRIND ROLLER BEARING RACES ON A FITCHBURG




SIDE FEED FOR TRUING
RAPID TRAVERSE
FEED CONTROL HANDWHEEL
FEED CONTROL DIAL
DIAMOND LEVER ARM-SWUNG OUT OF WAY WHILE GRINDING
TRUING DEVICE ADJ.
TIME DELAY DIAL
TABLE ADJ. HANDWHEEL
HYD. TRAVERSE FOR TRUING
HANDWHEEL FOR WHEEL WEAR
HYD. OR PNEUMATIC CYL. FOR CHUCKING WORK
HEADSTOCK SWIVELS FROM 0° TO 75°
HANDWHEEL FOR WORKHEAD ADJUSTMENT

. . . and other Chucking Grinding Operations

THE latest Fitchburg Roller Bearing Race Grinder employs a single standard Fitchburg Bowgage Grinding Wheelhead Unit. The workhead is adjustable from 0 degrees to 75 degrees so that the machine can be used for many other straight or taper grinding jobs.

The Fitchburg Roller Bearing Race Grinder is completely automatic. By pressing a single button the wheelhead goes through its standard automatic cycle — rapid traverse to the work, proper grinding feed, spark-out time, and rapid return. Work is held to limits of .0002" in production.

The workhead can be arranged either hydraulically or pneumatically for collet clamping or other chucking devices.

In this taper grinding application, the wheelhead is mounted on a 45° slide for trueing. The trueing device is mounted on the side of the base parallel to the wheelhead, and is hydraulically operated for trueing, with micrometer adjustment for positioning.

For grinding roller bearing races a Fitchburg grinds them faster and more accurately than other methods. A leading American manufacturer reports enthusiastically on the quality and low production cost of this machine. Write us today for complete information.

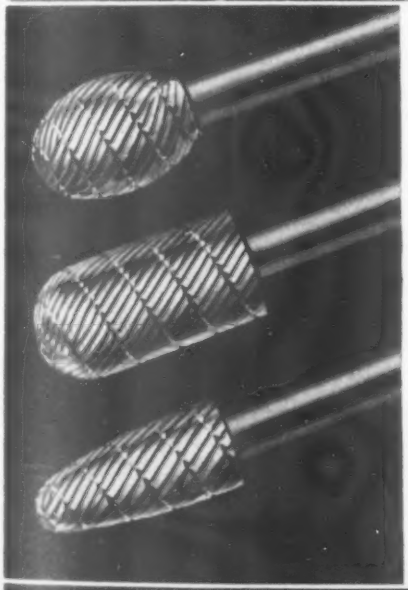
FITCHBURG GRINDING MACHINE CORP.

FITCHBURG, MASSACHUSETTS, U. S. A.

Manufacturers of — Bowgage Wheelhead Units, Multiple Precision Grinding Units, Spline Grinders, Cylindrical Grinders, Gear Grinders, Both Full Universal Grinders and Special Purpose Grinders.

Jarvis POWER TOOLS

HIGH SPEED TOOLS
for
HIGH SPEED PRODUCTION



Jarvis Flexible Shaft Machines

When used with correctly selected Jarvis Rotary Tools, these multiple-speed flexible shaft machines are the "power hands" of the metal working industry. They will perform many filing, grinding, sanding, buffing, brushing, cutting, and cleaning operations.

Jarvis Ground Rotary Files

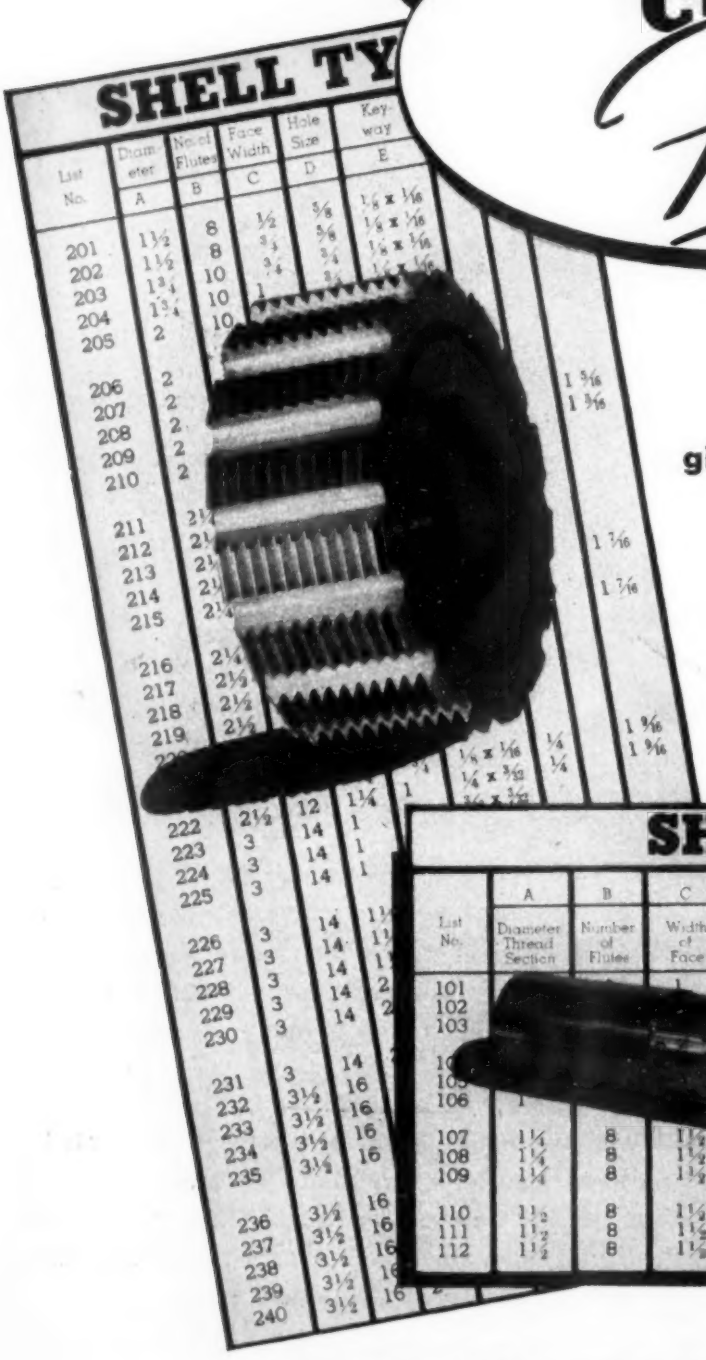
The recognized standard in thousands of manufacturing plants for fast, efficient performance. Now furnished with Jarvis Hy-speed Case, increasing tool life an average of three times. Send your high-speed steel rotary files back to Jarvis for regrinding. They will be furnished with life prolonging Hy-speed Case.

Send for our new catalog MFTI

THE CHARLES L. JARVIS CO., MIDDLETOWN, CONN.

TAPPING ATTACHMENTS • FLEXIBLE SHAFT MACHINES • GROUND ROTARY FILES

HOW TO GET THREAD MILLING CUTTERS *Faster*



SHELL TY

List No.	Diameter A	Number of Flutes B	Face Width C	Hole Size D	Keyway E
201	1½	8	½	⅝	⅛ x 1/16
202	1½	8	¾	⅝	⅛ x 1/16
203	1¾	10	¾	¾	⅛ x 1/16
204	1¾	10	1	¾	⅛ x 1/16
205	2	10			
206	2				
207	2				
208	2				
209	2				
210	2				
211	2½				
212	2½				
213	2½				
214	2½				
215	2½				
216	2½				
217	2½				
218	2½				
219	2½				
222	2½	12	1¼	1	
223	3	14	1	1	
224	3	14	1	1	
225	3	14	1	1	
226	3	14	1¼	1	
227	3	14	1¼	1	
228	3	14	1¼	1	
229	3	14	1¼	1	
230	3	14	1¼	1	
231	3	14	1¼	1	
232	3½	16	1¼	1	
233	3½	16	1¼	1	
234	3½	16	1¼	1	
235	3½	16	1¼	1	
236	3½	16	1¼	1	
237	3½	16	1¼	1	
238	3½	16	1¼	1	
239	3½	16	1¼	1	
240	3½	16	1¼	1	

SHANK TYPE

List No.	A Diameter Thread Section	B Number of Flutes	C Width of Face	D Length of Shank	E Length Overall	F Shank Diameter Large End	G Shank Taper: Jarno	G Shank Taper: Brown & Sharpe	G Shank Taper: Morse	H Drawbar Thread
101				3 11/16	5¼	.884	7	8		½-13NC
102						.922				¾-24NF
103									3	½-13NC
104										½-13NC
105										¾-24NF
106	1									½-13NC
107	1¼	8	1½							½-13NC
108	1¼	8	1½	4¼						¾-24NF
109	1¼	8	1½	3¾	5½	.948				½-13NC
110	1½	8	1¼	4 11/16	6¾	1.134	9	10		½-13NC
111	1½	8	1½	4⅞	6¾	1.271				¾-24NF
112	1½	8	1½	3¾	5½	.948			3	½-13NC

Order by

STOCK BLANK NUMBER

giving Pitch and Thread Form desired

•

DETROIT

STANDARD STOCK BLANKS MEET 90% OF ALL THREAD MILLING CUTTER REQUIREMENTS

FOR STANDARD STOCK SIZES, ASK FOR BULLETIN No. CB-43

BUY U.S. BONDS STAMPS

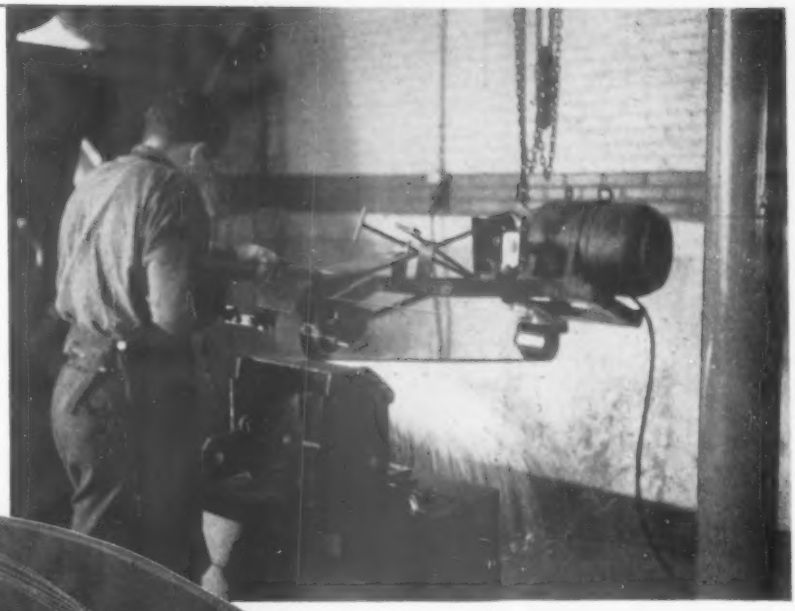
DETROIT TAP & TOOL CO.

8432 BUTLER
DETROIT 11
MICH. U.S.A.

NORTON ABRASIVES

Here you see the seam weld on a steel housing being both rough-ground and finished in the same fast belt operation.

Note the shower of sparks! Yet the belt disperses heat quickly.



METALITE CLOTH BELTS *Improve* Swing Frame Grinding!

NATURALLY! Their greater area and sharper surface obviously provide cooler, faster cutting and better finish.

A maker of stainless steel tanks for milk trucks, where finish was paramount, was influenced by one of our men to adopt this modern method for polishing the entire inside of the huge saucer-shaped end—a tough proposition.

Result: One man, one shift, now keeps ahead of a schedule that formerly required two men, two shifts.

If you run a Swing Frame Belt Grinder, send for our brochure "Metalite Cloth Belts Improve Swing Frame Grinding." If not, we can send you manufacturer's literature on the Grinder itself. Here's a handy coupon.

BEHR-MANNING
(DIVISION OF NORTON COMPANY)
TROY, N. Y.

Quality Abrasives Since 1872

QUALITY ABRASIVES

Please send the following literature:

.....Metalite Cloth Belts, etc.

.....The Swing Frame Abrasive Belt Grinder

Firm Name _____

Street _____

City _____ Zone _____ State _____

By _____ Title _____

Another Application of LeMaire Standard Hydraulic Units

HOLES IN LARGE MOTOR TRUCK BLOCK FROM SOLID CASTING

ROUGH DRILLED
SPOTFACED
SEMI-FINISHED
FINISHED REAM

ALL ON ONE MACHINE IN ONE CYCLE

1 HOLE 1¼" DIA. DRILLED AND REAMED TO ±.001

2 HOLES 2" DIA. DRILLED AND REAMED TO ±.001

1 HOLE 1¼" DIA. AND ONE 2½" SPOTFACED (ALSO WALL FINISHED) TO ±.001

ELIMINATING MOST HANDLING OF HEAVY PART

SAVING TIME, LABOR—MULTIPLYING PRODUCTION MANY TIMES

By being conveyor indexed, this machine can complete in one cycle—from solid casting to finished boring—four holes in a heavy truck cylinder block. This progressive set-up eliminates the handling of heavy parts from one machine to another.

While the first station drills 4 holes, the second station (equipped with 4-spindle head) semi-finish reams. In the meantime, the third station finish reams two 1¼" and two 2" holes, holding center distances between holes to .001 tolerance.

All stations are equipped with our standard hydraulic units mounted at a 10 degree angle on the face of the columns. The third station is equipped with a sliding type unit.

Avail yourself of the broad experience of LeMaire engineers if you have problems involving high production with precision machines.

BUY WAR BONDS

LeMaire TOOL & MFG. CO.

2663 S. TELEGRAPH ROAD ▲ DEARBORN, MICHIGAN

ENGINEERS AND BUILDERS OF PRODUCTION MACHINES

How many hands does a turret lathe operator need?

— only two — if it's a Jones & Lamson

Many a turret lathe operator must have wished, at times, that he were like the six-armed deity of the Hindus, for faster-cutting tools have greatly increased the productivity of these machines and the burden upon the operator. The necessity for simplified controls to save waste motion and operator fatigue is, therefore, imperative!

Jones & Lamson Universal Turret Lathes ar designed not only to take full advantage (the fastest-cutting tools, but also to give every mechanical aid to the operator so that he can operate to the maximum capacity of the machine without undue fatigue.

We show here some of the man-saving, time saving features built into these machines Write to us for more detailed information and descriptive literature.

SINGLE LEVER SPINDLE SPEED SELECTOR

With direct reading dial, to control all spindle speeds. Next speed pre-selected while cut is in progress.

POWER TRAVERSE AND INDEXING OF THE HEXAGON TURRET

Turret of saddle type machines is power traversed and power indexed. A time saver and man saver too.

SINGLE LEVER FEED SELECTORS

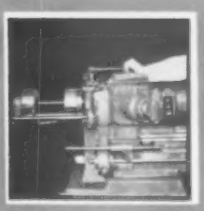
Controlled by single lever, direct reading, selectors. Feeds pre-selected while cut is in progress.

AUTOMATIC LUBRICATION SYSTEM

Requires minimum of attention. Flow of lubricant automatically increases as spindle speed increases.

AUTOMATIC COOLANT SUPPLY TO HEXAGON TURRET

A copious supply of coolant is pumped automatically to the working face of the hexagon turret.



SIMPLIFIED BAR FEED AND COLLET OPERATING MECHANISM

Operated by a single lever, which opens chuck, feeds in stock and closes chuck.

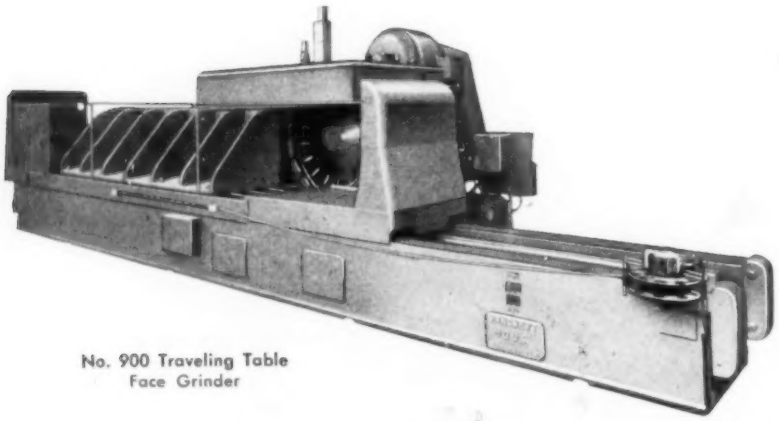
All these features and many others are incorporated as standard in Jones & Lamson Universal Turret Lathes.

JONES & LAMSON
MACHINE COMPANY
Springfield, Vermont, U.S.A.

Manufacturers of: Universal Turret Lathes • Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers.

EXAMPLE: Edge-Grinding Armor Plate to .005" Tolerance*

Series 4000 Hanchett Hydraulic Traveling Table Face Grinder in operation at McInerney Spring & Wire Co., Grand Rapids, Mich.



No. 900 Traveling Table Face Grinder

In the above illustrated example of edge-grinding armor plate for welded tanks and combat cars the Hanchett 4000 Traveling Table Face Grinder is doing a job accurately to .005" tolerance and consistent with the time demands of a speeded war effort. ** In many instances tolerances of .0005" are maintained on a production basis.* For continuous, trustworthy performance this machine cannot be outperformed for the job it is doing day and night through long grueling hours of production punishment.

Made in five sizes, this machine has range to finish hundreds of jobs, large or small. Operators like its handling ease and time-saving centralized controls, always within reach. For full information on Hanchett Traveling Table Face Grinders, write for Bulletin 170T-10.

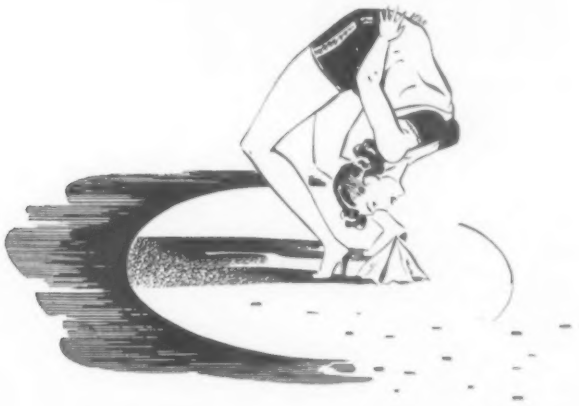
Series No.	HP	Wheel Size	Table Width
900	40	36"	24"
1000	30	30"	24"
2000	25	30"	22"
3000	20	24"	22"
4000	15	20"	20"

Table lengths: 50 inches to 24 feet.

HANCHETT GRINDERS — BIG RAPIDS MICHIGAN

IF IT'S A FLAT SURFACE—THERE'S A HANCHETT TO GRIND IT

HANCHETT MANUFACTURING CO.
BIG RAPIDS, MICHIGAN U.S.A.

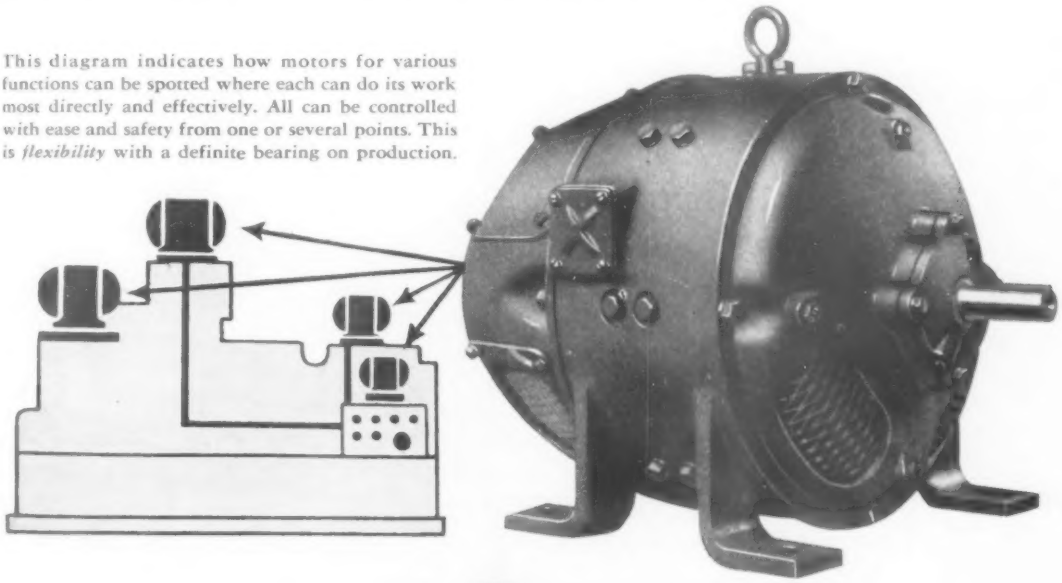


FLEXIBILITY

To designers and users of modern production machines Reliance Motor Drive offers flexibility combined with simplicity. Without gears, brakes, clutches or other mechanical go-betweens it performs all these functions: speed control, reversing, controlled acceleration, braking, remote control, slow speeds for inching, threading or inspection.

Reliance application engineers are production minded. They have had wide experience in cooperating with manufacturers' engineers on specific motor-drive applications. We think you will like the way they work. Just phone or write our nearest office.

This diagram indicates how motors for various functions can be spotted where each can do its work most directly and effectively. All can be controlled with ease and safety from one or several points. This is *flexibility* with a definite bearing on production.



RELIANCE A-C D-C MOTORS

RELIANCE ELECTRIC & ENGINEERING CO.

1088 Ivanhoe Road · Cleveland, Ohio

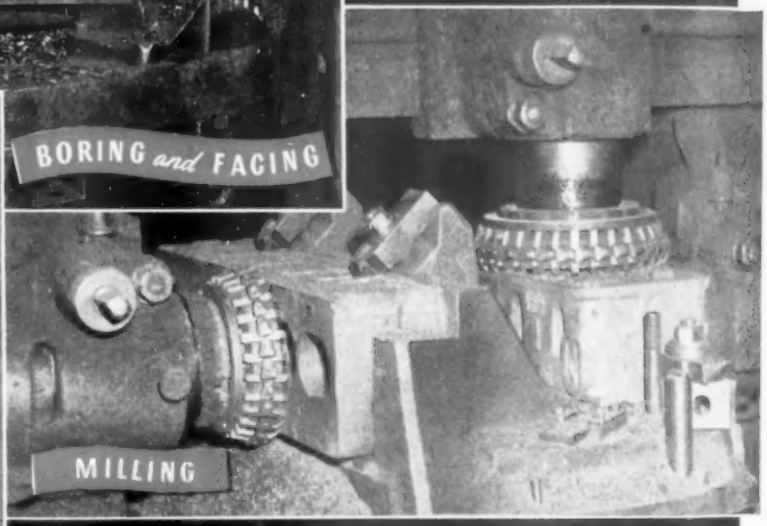
Birmingham • Boston • Buffalo • Chicago • Cincinnati • Detroit • Greenville (S.C.) • Houston • Los Angeles • Minneapolis • New York Philadelphia • Pittsburgh • Portland (Ore.) • St. Louis • Salt Lake City • San Francisco • Syracuse • Washington, D. C. • other principal cities.

LATROBE

RED ARROW 101

for

METAL CUTTING TOOLS



*What users say!**

SUPERIORITY

"Grooving brass shells at 860 S.F.M. We get 10,000 to 11,000 pieces per grind compared with 6,600 pieces per grind with former tools."

LONGER TOOL LIFE

"Your Red Arrow 101 has been running 40 hours between grinds at 400 S.F.M. on grey iron. Our operators like it better because cutting edges do not break down and that means more production faster."

TOUGHNESS

"We are machining steel rings which are welded and steel castings with intermittent cuts. We plan to use Red Arrow 101 on all our tough jobs."

LESS TOOL GRINDING

"We find Red Arrow 101 very satisfactory. It runs double the production of other tools we have used on our boring jobs."

HIGHER SPEEDS

"Red Arrow 101 tool bits enable us to increase the surface speed 100% with four times the tool life."

**Selected at random from field reports.*

Write for this Bulletin ←

Latrobe RED ARROW 101—the Cobalt-Chromium-Tungsten alloy that can be cast into many types of metal cutting tools—is furnished in the "as cast" state ready for grinding to finished tool dimensions. Improved casting technique enables us to produce castings of such uniform structure that "notching" of the gate end of Tool Bits is unnecessary. Standard Tool Bits are carried in warehouse stocks.

Latrobe RED ARROW 101 requires no heat treatment; is easily brazed to tool shank or body; will operate at greatly increased speeds and effect valuable savings in production time.

Ask our service department to help you with any problem concerning the use of Latrobe RED ARROW 101—either applications, speeds, grinding, brazing or any other detail.

Latrobe ELECTRIC STEEL COMPANY

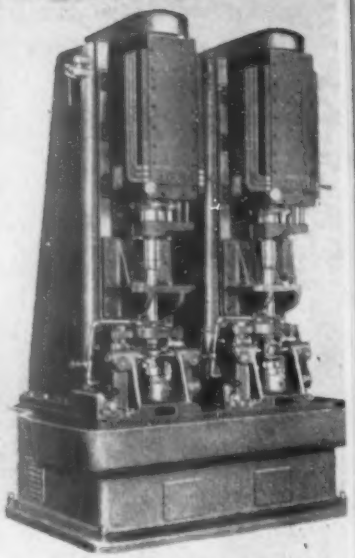
MAIN OFFICES *and* PLANT · · LATROBE · PENNSYLVANIA

4

XLO

EX-CELL-O for PRECISION

Above is shown an instance where the Ex-Cell-O Small Hydraulic Unit (Style 21) is used on a machine for the accurate drilling of holes in oil pump bodies.



On this Ex-Cell-O double drill press, two Style 25-A Ex-Cell-O Hydraulic Units are mounted on the columns in vertical position. This has definite advantages on certain classes of work.

Plan Now for ECONOMICAL PRODUCTION!

Production Machines equipped with Ex-Cell-O Hydraulic Units have numerous advantages

For the machine you build, or the machine we build, the use of Ex-Cell-O Hydraulic Power Units provides these features:

They are compact, for proper design.
They are self-contained, for ease in installation.
They have infinite feeds, for proper cutting.
They have gear change, for proper speeds.
They have ample power, for multiple-head operation.
They have variable stroke, for greater flexibility.

Ex-Cell-O Hydraulic Power Units are standard and produced in quantities, but in nearly every case where the unit is used it becomes a part of a special, high production type machine for a specific operation. These units are economical because, as applications change, the units can become a part of the new machine even though entire base is redesigned.

The units can be mounted on any plane—horizontally, vertically, or angularly—on a temporary or a permanent base, and they can be arranged so that it is possible to use them in connection with guide bars and multiple drill heads.

Find out today how Ex-Cell-O Special Machines and Ex-Cell-O Hydraulic Power Units can fit your program for today's and tomorrow's production.

Where high production, accuracy, and economy through multiple operations are required—consult EX-CELL-O now

EX-CELL-O CORPORATION

DETROIT 6, MICHIGAN

SPECIAL MULTIPLE WAY-TYPE PRECISION BORING MACHINES • SPECIAL MULTIPLE PRECISION DRILLING MACHINES • PRECISION THREAD GRINDING, BORING AND LAPPING MACHINES BROACHES • HYDRAULIC POWER UNITS • GRINDING SPINDLES • DRILL JIG BUSHINGS • CONTINENTAL CUTTING TOOLS • TOOL GRINDERS • DIESEL FUEL INJECTION EQUIPMENT • R. R. PINS AND BUSHINGS • PURE-PAK CONTAINER MACHINES • PRECISION AIRCRAFT AND MISCELLANEOUS PARTS

DALZEN THREAD GRINDER, No. 5, WITH GUARDS REMOVED

IN THREAD GRINDING . . . THE *DRESSER'S* THE THING!

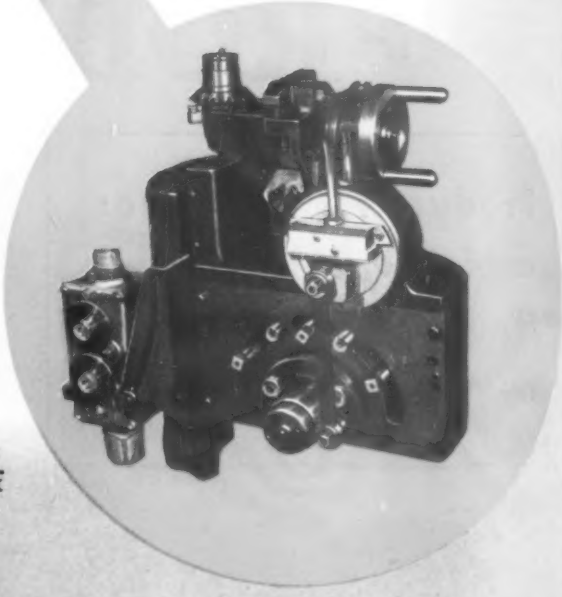
AUTOMATIC DRESSING IS PROVIDED IN THIS *New* DALZEN *Electronic* THREAD GRINDER

● Accuracy of a ground thread depends upon the accuracy of the dressed wheel. Precision, finish and production efficiency in thread grinding are determined primarily by the dresser.

DALZEN engineers always have recognized this fact. Now . . . the new DALZEN Electronic Thread Grinder presents the latest and best in dresser efficiency—offering new and special advantages in dressing performance.

The new DALZEN Thread Grinder with General Electric Thy-mo-trol drive provides maximum production of threaded parts, thread gages, straight and spiral fluted taps, and thread milling cutters. Grinding speed—both wheel and work—forward and reverse—is adjusted by the twist of a dial. Variation is infinite and stepless. It's an investment in *better* thread grinding, and a *low-cost* investment at that!

An attractive three-color folder describing the new DALZEN Models 5 and 6 will be sent you, free of charge, on request.



DALZEN

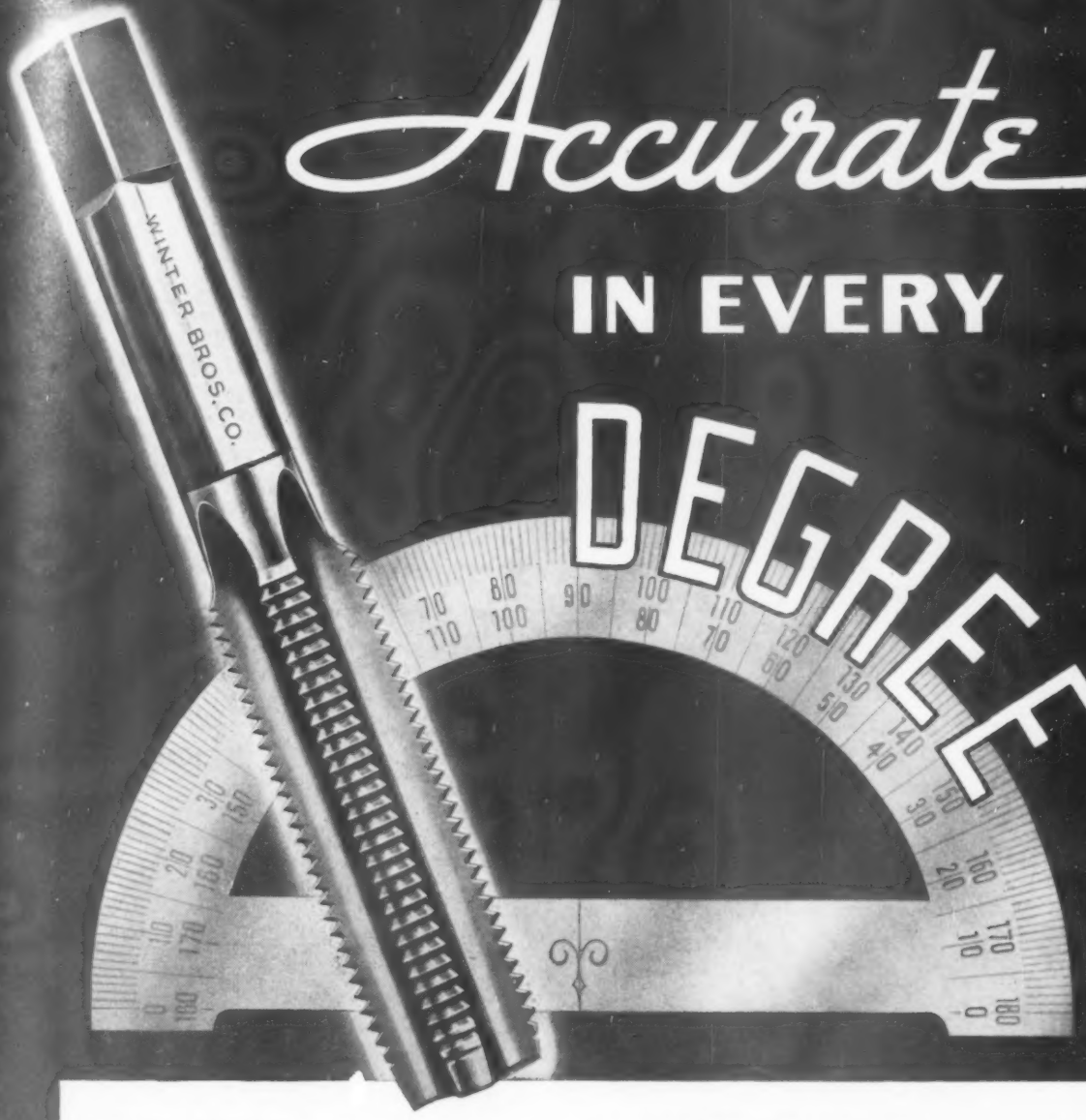
TOOL & MANUFACTURING COMPANY

12255 EAST EIGHT MILE ROAD • DETROIT (5), MICH.

Accurate

IN EVERY

DEGREE



The degree of Accuracy that made WINTER TAPS the approved threading tools of a host of Nationally known manufacturers will serve you equally well on all YOUR tapping jobs.
Give them the care you would any other precision tool and they will be cutting good threads long after you would normally expect to discard them.

A DIVISION OF THE NATIONAL TWIST DRILL & TOOL CO., ROCHESTER, MICHIGAN

Winter Brothers

COMPANY
BRANCH STORES

Wrentham, Massachusetts, U.S.A.
SAN FRANCISCO, CALIFORNIA · CHICAGO, ILLINOIS · DETROIT, MICHIGAN

Better Holes
FINISH-REAMED
Faster!

Two blades spiral in a direction opposite to that of the third, simultaneously, shearing a mirror-smooth finish, fast and accurately on ferrous and non-ferrous metals, as well as fibrous plastics. Straight line expansion from .035" to .080".

The PATENTED
DUAL-SPIRAL
EXPANSION REAMER

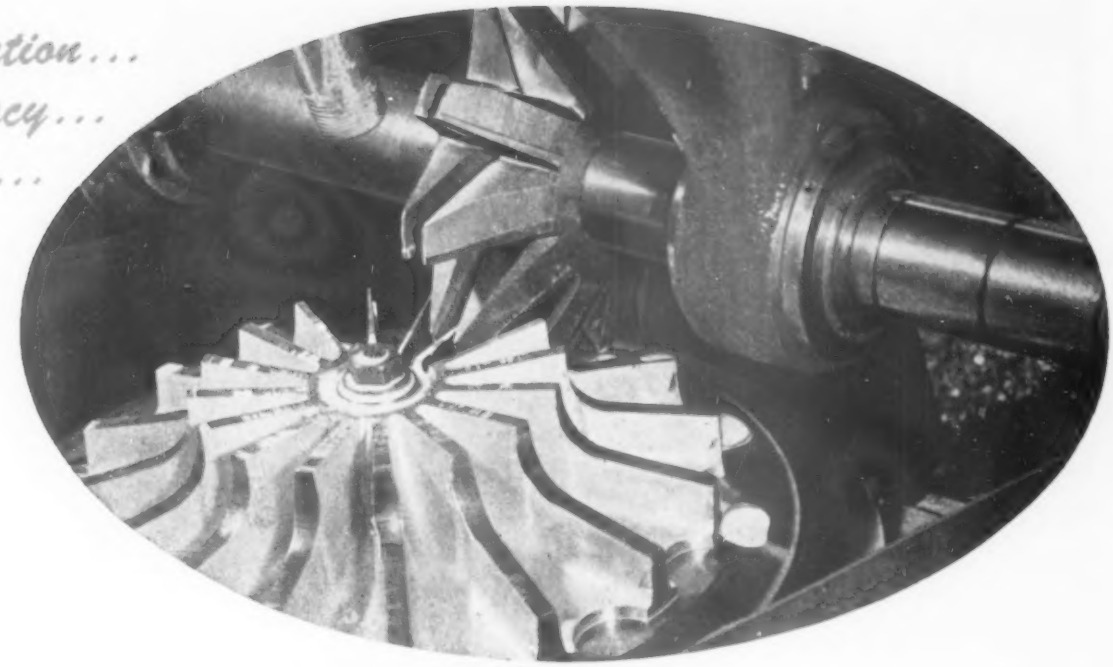
Reams smoothly over keyways and split bushings. Adjustable for size, without changing set-up. Extension pilots for alignment jobs. Morse taper shanks, or butt shanks available for lathe work. Leaves no abrasive in holes, thereby saving costly wear on plug gauges.

LEMPCO

5761 DUNHAM RD., BEDFORD, OHIO

WRITE FOR SPECIFICATIONS

Production...
Accuracy...
Finish...



ANOTHER EXAMPLE OF

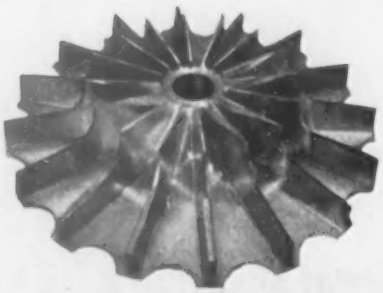
BARBER-COLMAN CUTTER PERFORMANCE

STRADDLE MILLING

IMPELLER FOR AIRCRAFT ENGINE SUPERCHARGER

WITH *Specially Engineered* B-C MILLING CUTTERS

The problem here was to straddle mill the sides of the irregularly-shaped fins of an aluminum forging, removing approximately ⅛" on each side. A fine finish was required as well as an extremely accurate and smooth radius at the base of each fin. Barber-Colman engineers, working in conjunction with the machine designers, produced the special cutters shown in action above. Since the cut became much heavier as it neared the hub, an automatic feed change from an initial 11" to 3" per min. was introduced. The cutters, which are 8½" dia., run at a speed of 218 r.p.m. The floor-to-floor time on the complete straddle milling of 16 fins is 21.3 minutes. These cutters are profile ground, and give 75 pieces per grind. *Special cutters by Barber-Colman are demonstrating similar high production efficiency on many difficult jobs.*



This shows the finished impeller. After a sweep milling operation between the fins, which follows the straddle milling shown above, the piece requires only polishing because of the fine finish obtained in the two milling cuts.

Buy War Bonds

BARBER B-C COLMAN PRODUCTS

HOBS, HOBBING MACHINES, HOB SHARPENING MACHINES, REAMERS, REAMER SHARPENING MACHINES, MILLING CUTTERS, SPECIAL TOOLS

Barber-Colman Company

GENERAL OFFICES AND PLANT • 105 LOOMIS STREET • ROCKFORD, ILLINOIS, U. S. A.

MORE SURFACE GRINDING

GRINDING TIME REDUCED to 15% of Former Standard!

The proof piles up—through actual War Production Test Runs in busy plants . . . and Cortland Chucks and Segments are winning with outstanding performance.

For instance: A Production Test on a Blanchard No. 18 Vertical Surface Grinder by a manufacturer of filing machines and band saws. Wheel speed 705 R.P.M.

WORK: Saw tables for Vertical Band Saw Machines —close grained gray iron, not machined before grinding; 547.49 sq. in. top side; 1 piece per table load.

Here are the amazing Production Test facts—showing how Cortland Chucks and *Diagonal Shearing* Segments beat another brand by more than 6 to 1 in grinding performance.

Detail	CORTLAND Chuck and Segments	*Competitive Brand of Sectored Cylinder*
Cubic inches of stock removed per inch in height of segments	418.81	38.12
Ampere readings	50	75 to 100
Dressings necessary	None	1
Work heat?	No	No
Grinding time	79 secs.	528 secs.

In addition to the great saving in grinding time, 6½ times more stock was removed by Cortland Chuck and Segments per unit height of abrasive.

Why not find out how Cortland Chucks and *Diagonal Shearing* Segments can increase the quality and quantity of your grinding output? Write for latest illustrated bulletin giving complete story of Cortland performance.

CORTLAND GRINDING WHEELS CORP.
14 Cortland Street **Chester, Massachusetts**

Diagonal Shearing with Varying Contact Means Better Surface Grinding

A true segment, the grinding surface has narrow ends that *start* the work with minimum shock and resistance. Straight inner edge of segment passes diagonally across work with a *shearing* action that *cuts* and *removes* the metal. Varying contact area insures longer exposure to coolant—decreases heat—reduces segment wear—conserves power.

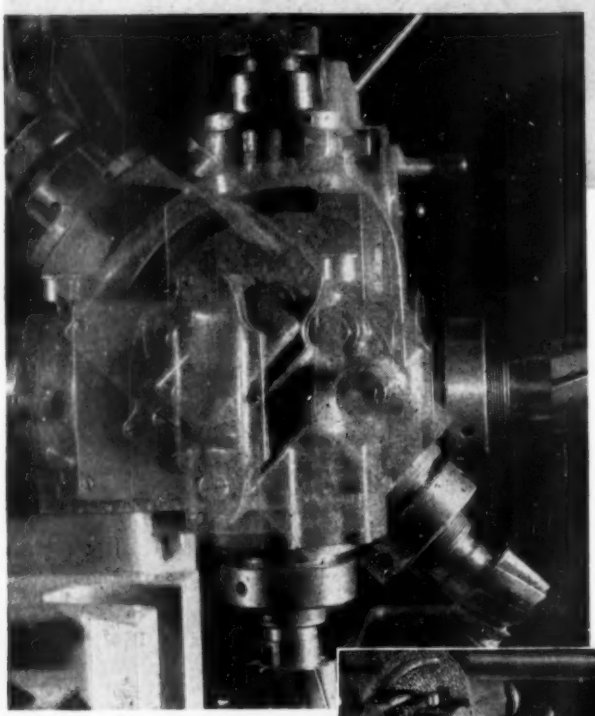
CORTLAND
Chucks and Segments

STANDARD AND
SPECIAL CUTTING TOOLS
TELEPHONE • LEXINGTON 5380
For precision carbide or hi-speed cutting tools that are setting new standards in performance and service . . . to meet the high production schedules required in modern manufacturing.
ARCHER & SMITH
LIMITED
CARBIDE Cutting Tools HI-SPEED
125 N. EASTERN AVENUE LEXINGTON 34, KENTUCKY
Sales Representatives:
Opportunities in some territories for the "right" representation. If you feel that you qualify to serve the cutting tool requirements of metalworking industries in your area.
WRITE FOR CATALOG • SEND FOR BLUEPRINTS
FOR ALL THAT IS BEST FOR PRECISION AND SERVICE IN CUTTING TOOLS
ARCHER & SMITH, LTD.,
125 NORTH EASTERN AVE.
LEXINGTON 34, KENTUCKY
Please send latest Cutting Tool Catalog. ☐ Blueprints of special tools we require are enclosed; or ☐ mailed under separate cover.
Name
Firm Name
Title
Address
City
State

VAN NORMAN

RAM-TYPE UNIVERSAL MILLERS

Save Set-Ups, Cut Cost on Milling



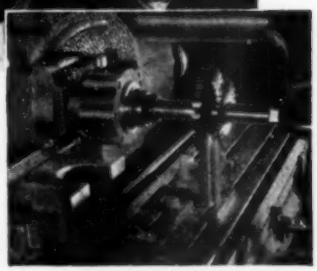
Idle machine time, caused by reset-ups, often cuts the productive capacity of milling machines by as much as 70%.

You can reduce these time-wasting reset-ups and increase machine and operator output up to 40% overall time with Van Norman Ram-Type Universal Millers.

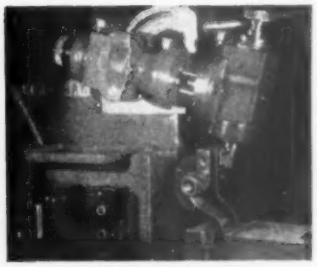
Here's how it's done. The operator first sets up the workpiece. Then, by simply changing the position of the adjustable cutterhead from horizontal . . . to angular . . . or vertical positions, and by moving the movable ram in or out — the operator performs practically all his milling operations with minimum reset-ups. Result — faster work, greater machine capacity and less possibility of errors.

Add to the above advantages . . . directional front and rear controls of all power feeds, large easy-to-read dials . . . solid rigidity — and you'll readily see how Van Norman Ram-Type Universal Millers assure greater accuracy, increase output and cut costs.

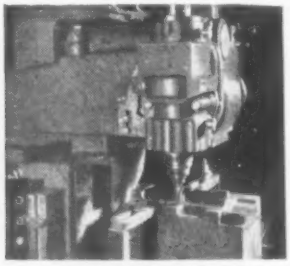
ADJUSTABLE CUTTERHEAD Gives Vertical . . . Angular . . . Horizontal Milling — All on *ONE* Van Norman Ram-Type Universal Miller.



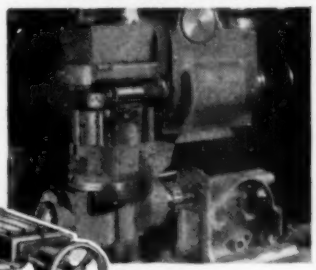
HORIZONTAL MILLING



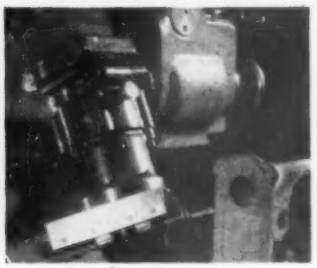
ANGULAR MILLING



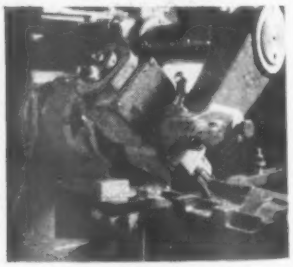
VERTICAL MILLING



BORING



SLOTTING



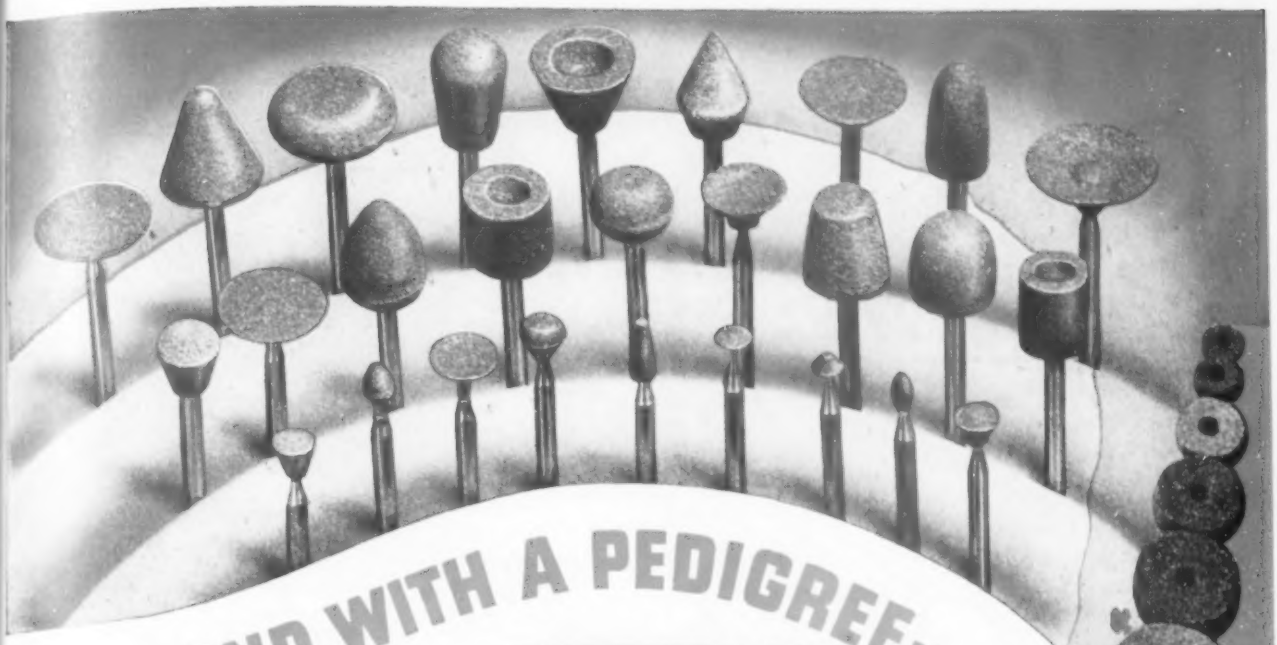
ANGULAR MILLING

No 22L
RAM TYPE UNIVERSAL MILLER

VAN NORMAN COMPANY

SPRINGFIELD 7, MASSACHUSETTS

"It pays to Van Normanize"



THE BOND WITH A PEDIGREE..

Chicago FV

A thousand test formulas—hundreds of bonds of various kinds—fifty years experience making bonds for the world's best grinding wheels—this is the Pedigree behind the new FV Bond.

FV Bond holds wheel shapes firm even when run at high speed, and produces a satin-like finish that is so accurate it passes any surface analyzer test hands down.

FOR THAT PERFECT FINISH

Today's precision instruments and tools as well as mass production of war equipment parts, call for finishes with closer tolerances than ever before—finishes that can be measured in micro inches. Just any old wheel won't do. That's why this better bond—FV—was developed for all Chicago Wheels.

There's a best grain, grade, size and shape wheel—all made with FV Bond — for each kind of material to be finished — a whole army of Chicago Wheels at your service.

CHICAGO MOUNTED WHEELS

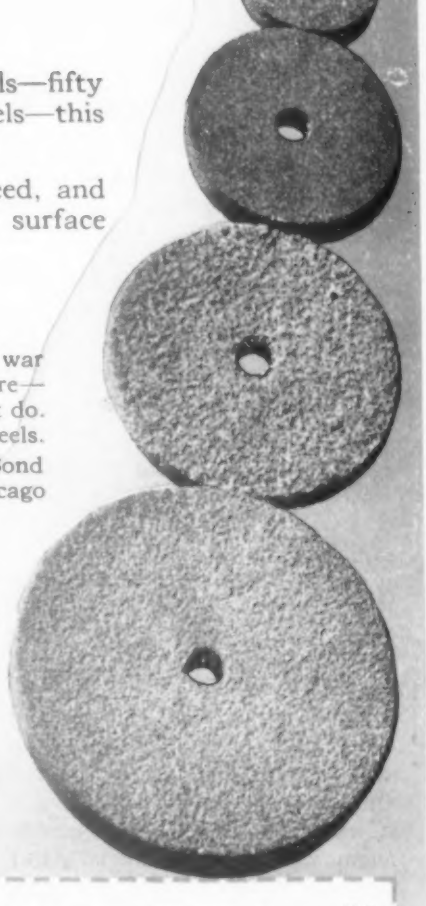
All the most needed shapes, each mounted firmly on its own steel shank to last as long as the wheel itself.

CHICAGO GRINDING WHEELS

For the duration, with full WPB approval, we are specializing on sizes up to 3" in diameter only.

TRY ONE! It's the quick way to find out about FV Bond. We'll make it easy for you by sending, without charge, any size you specify to fit any grinder.

FREE ENGINEERING ANALYSIS Some of the new metals, alloys and laminates present real grinding problems. If you have a job that stumps you, our experts will work with you to determine the best wheel to give the job *that perfect finish* in the quickest time.



Write for Catalog & Engineering Survey Form

★ Half a Century of Specialization has established our reputation as the Small Wheel People of the Abrasive Industry.

CHICAGO WHEEL & MFG. CO.
1101 West Monroe St. Dept. TE Chicago 7, Ill.

Send Catalog and Survey Form. Interested in: TE-8
☐ Grinding Wheels. ☐ Mounted Wheels.
☐ Send Test Wheel. Size .....
Name .....
Address .....

Are Your War Contract Machines

CONVERTIBLE?

Here's an experience that may suggest what you can do about conversion—NOW! . . . .

THIS IS the story of how one of our leading manufacturers "disposed" of a group of surplus war production machines by having them converted to a different operation on a different contract—at a money saving of about one third of the cost of buying new machines of comparable efficiency.

There were eight machines in all, two each of three well-known standard makes and two Snyder "specials." When our study of the proposed production operation indicated that conversion was practical, the machines, consisting of base end sections with machine unit slides upon them, were shipped to our plant.

Converting the standard machines involved building new center sections (between each pair of base ends) upon which fixtures were mounted. Two-spindle milling heads were mounted on the sliding sub-assembly units and as these units were of three different designs it was necessary to use specially made adapters so that identical milling heads could be used throughout.

When conversion was completed, we delivered to our client five two-way machines, hydraulically operated and electrically controlled, for a medium sized milling operation upon an ordnance part. Three machines were made from the three pairs of standard units and two from the two Snyder "specials."

This job is typical of many retooling jobs that can be done when war contracts are terminated and the urgent need of the moment is to convert every possible machine to postwar application.

Not all machines will be so readily convertible, of course, but many will and it may be possible that many manufacturers will be able to buy their present machines from the government at favorable prices, have them converted, replace them in their line and put them to work on civilian goods at a very substantial saving in capital investment and at an even more important saving in time.

Such procedure would help greatly in solving the three-way problem of disposing of government-owned machinery, getting necessary new machinery and getting floor space for the changeover.

And, of course, getting machines converted in a matter of weeks instead of having to wait months for new machines naturally is going to help in getting men back to work quickly.

Whether conversion is practical in the case of your machines depends upon a number of factors which we will be glad to discuss with you if you will write us fully, listing your machines and describing your proposed products and production objectives.

Edward Snyder

PRESIDENT

SNYDER TOOL AND ENGINEERING COMPANY

3400 East Lafayette • Detroit 7, Michigan

SNYDER

DESIGNERS AND BUILDERS OF SPECIAL-PURPOSE MACHINES FOR HIGH PRODUCTION AT LOW UNIT COST

20 Years of Successful Co-operation with Leading American Industries

ONE of the best ways not to play hob with a hob is to be sure of your grinding wheel and this applies to any piece of tool room grinding. But if you want to get the best results, be sure you have a free, cool-cutting wheel that holds its shape like the "Aloxite" AA Wheel by Carborundum.

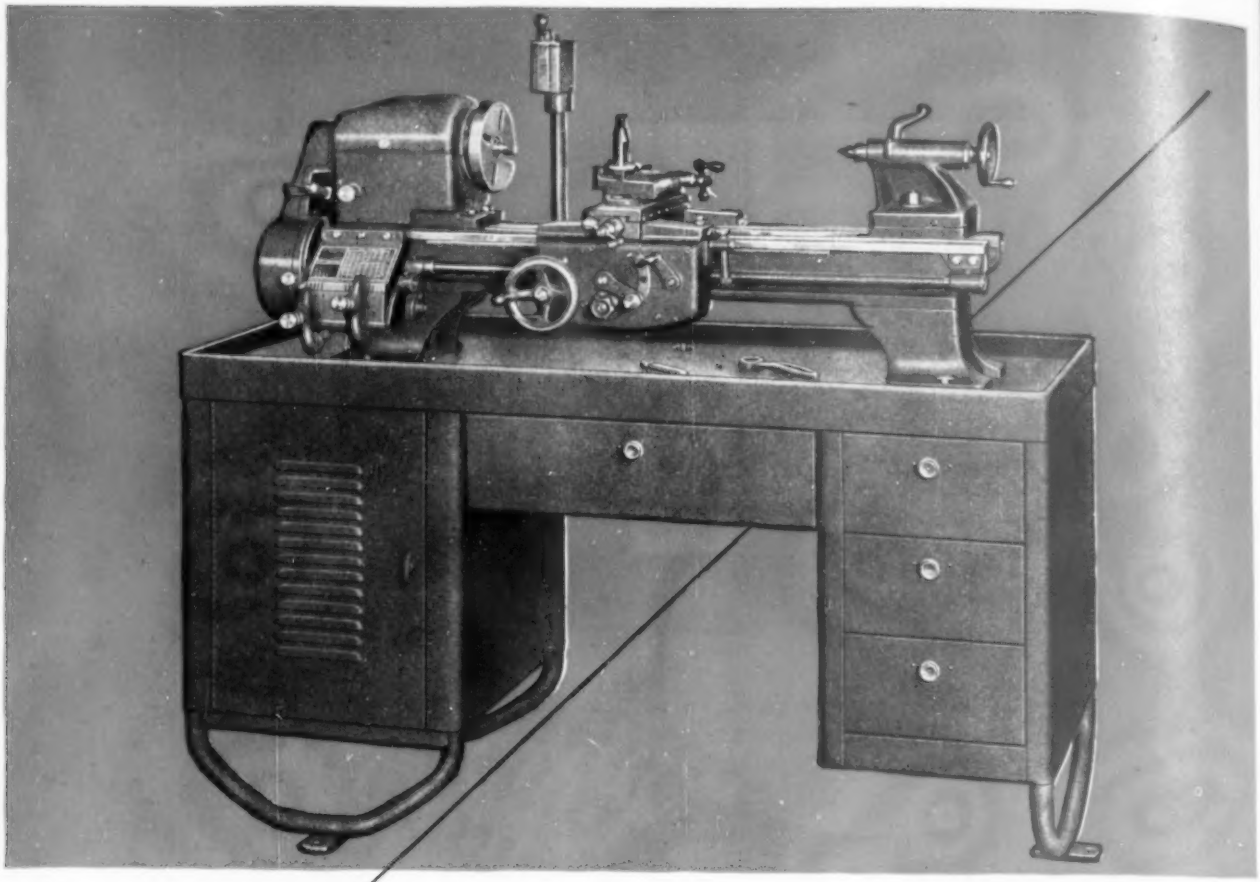
There have been a lot of new techniques developed during the last few years. New techniques in centerless grinding. New methods of cylindrical grinding. New ways to deburr, finish and polish metal. All of them have contributed to the progress of grinding. The man who knows all the angles is your Carborundum Sales Representative. Let him survey your requirements. Perhaps he can help you do even a better job. Just consult nearest distributor or The Carborundum Company, Niagara Falls, N. Y.

CARBORUNDUM
TRADE MARK
ABRASIVE PRODUCTS

Sales Offices and Warehouses in New York, Chicago, Philadelphia, Detroit, Cleveland, Boston, Buffalo, Pittsburgh, St. Louis, Cincinnati, Grand Rapids

Grinding Wheels by CARBORUNDUM
TRADE MARK

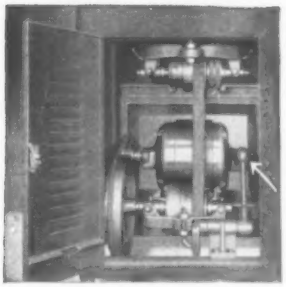
(Carborundum and Aloxite are registered trade marks of and indicate manufacture by The Carborundum Company)



Logan Presents

NEW QUICK CHANGE GEAR CABINET LATHE

With Automatic Apron



The Logan Cabinet Lathe is particularly adaptable to tool room work, for maintenance, for training, or for production. It is not only built with features and to standards of precision that are outstanding in its field, but it also has the durability to stand up under continuous production use. The carriage with friction-feed automatic apron travels over a rugged, warp-free bed that is ground to within .0005" of absolute accuracy. The total run-out of its headstock spindle 12 inches from the bearings is less than .001". The lead screw is held to within .002" in 12 inches. The spindle turns on a double row of preloaded, grease sealed ball bearings, and at 40 other vital points throughout the lathe friction is minimized by self lubricating bronze bearings. Four large drawers in the strong tubular steel cabinet may be used for tool storage. Each drawer has an individual lock. Left hand compartment contains underneath motor drive and countershaft. The entire cabinet stands on a 3-point base, assuring a steady installation on any floor. All moving belts and gears are completely enclosed. Ask your Logan dealer or write for catalog information.

UNDERNEATH DRIVE: Completely self contained and enclosed in left compartment of cabinet. For easy, safe belt changing, the lever (indicated by white arrow) is pulled outward to release flat belt tension. Adjustments of both flat belt and V-belt tensions are easy to reach. Multiple V-Belt Drive transmits power from cone pulley to spindle.

BRIEF SPECIFICATIONS: Swing over bed, 10½" . . bed length, 43⅛" . . . spindle hole, $2^{13}/_{32}$" . . . precision ground ways: 2 prismatic V-ways: 2 flat ways . . 12 spindle speeds, 30 to 1450 r.p.m. . . . worm drive from lead screw spindle for power feeds . . . friction clutch on power feeds . . . longitudinal feed .0015 to .1000" per spindle revolution . . . cross feed .25 times longitudinal feed . . . half nut drive from lead screw for thread cutting . . . Threads, 48 selections RH or LH, 4 to 224 per inch . . . self lubricating bronze bearings at 40 separate points.

Logan

LOGAN ENGINEERING CO.

CHICAGO 30, ILLINOIS

A NAME TO REMEMBER WHEN YOU THINK OF LATHES

PRODUCTION "SUPERCHARGER"

TURNER
UNI-DRIVE
Motorizes Machine Tools

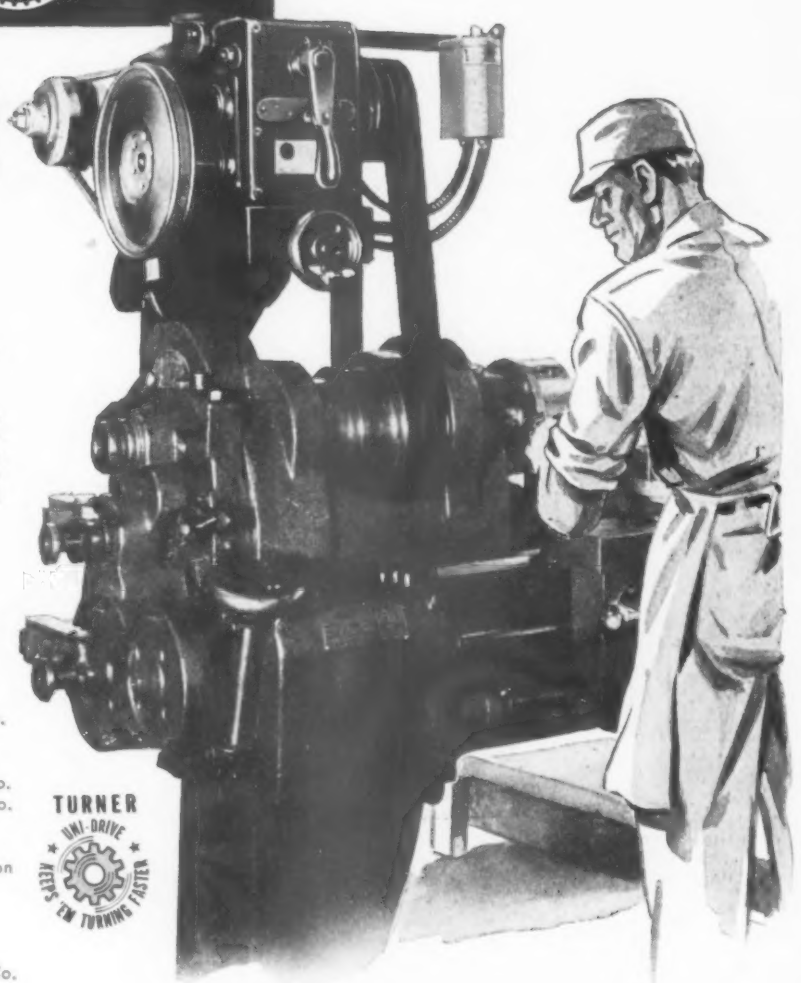
KEEPS MACHINE TOOLS HUSTLING

1 **No belts to shift. Drives to large step of cone at all speeds.**

2 **Eliminates overhead line and counter shafts.**

3 **All advantages of geared head, with belt drive smoothness.**

TURNER UNI-DRIVE is speeding schedules on every shift in hundreds of plants. Eases operators' work. Cuts costs. Saves time. Gets increases in production capacities running up to 25%—100%—300%. Each unit operates independently of all others—high and low speeds at will.



SOME TYPICAL USERS OF TURNER UNI-DRIVE

American Brake Shoe & F. Co.
Kellogg Division
Southern Wheel Division
Augusta Arsenal
Bendix Aviation Corp.
Brown-Lipe-Chapin Div. General Motors
Cessna Aircraft Corp.
Chicago, Rock Island & Pacific R. R. Co.
Delco-Remy Co. Div. General Motors
Diehl Manufacturing Co. Div. Singer Mfg. Co.
Doehler Die Casting Co.
Electric Auto-Lite Co.
Frankfort Arsenal
Frisco Lines
Holtzer-Cabot Elect. Co.
International Projector Co.
Kohler Corp.
Monsanto Chemical Co.
The New York Air Brake Co.
Ohio Pattern and Fdry. Co.
Oneida, Ltd.
Parker Appliance Co.
Republic Steel Corporation
Revere Copper and Brass, Inc.
SKF Industries
Southern Railway Co.
The Timken-Detroit Axle Co.
The Todd Company
W. A. Sheaffer Pen Co.
Wagner Electric Co.
Worthington Pump Co.

SEE YOUR DEALER NOW—OR WRITE US FOR DETAILS

For lathes, shapers, milling machines, turret lathes, radial drills, boring mills, hobbing machines, Brown & Sharpe and Cleveland Automatic Screw Machines and other tools—

NOW AT WORK FOR VICTORY ★★★

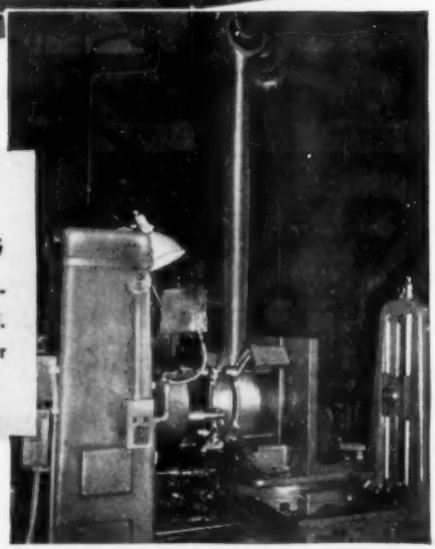
THE TURNER UNI-DRIVE COMPANY
(Sales Division: Turner Machinery Co.)
3416 Terrace St. Kansas City 8, Mo.

PRODUCING MACHINE TOOL DRIVES • ORDNANCE TOOLS • AIRCRAFT FITTINGS

HOW TO HANDLE LONG AND UNWIELDY WORK

1 LATERAL MOUNTING
Milling the squares on a long shaft mounted at right angles to the machine spindle.

2 LONGITUDINAL MOUNTING
Drilling and reaming the flanged end of a large shaft. The end support has been removed to allow the workpiece to overhang both table and bed.



3 VERTICAL MOUNTING
Large connecting rod being bored and threaded. This is a simple setup for unusual work.

Open Construction of Horizontal Boring Machine Permits Unhampered Extension of Work in Three Directions

At times you may be confronted with machining unusually long or large workpieces. The open type construction of the horizontal boring machine permits the handling of this type of work. It is possible to set up unwieldy shafts or parts with extensions in any plane—vertical—longitudinal—lateral. Once the workpiece is mounted on the table, actual machining operations are quite simple.

No. 1—Lateral Mounting—Here is an example of how the squares of an exceptionally long shaft were machined. When milling the center square, the shaft balanced on the table. When machining the end squares, the shaft rested with one end on the table, and the other on a roller support, giving the table freedom to travel crosswise for milling.

No. 2—Longitudinal Mounting—Here is an example of how the flanges of a long shaft were machined. After removing the end support, it was only necessary to provide an auxiliary support for the shaft, equipped with rollers, to relieve the table and clamps of excessive strain. Free cross travel of the table, and vertical travel of the headstock permits drilling and reaming of all flange holes without trouble. Turning and facing of the flange, concentric with the shaft, can also be performed in the same setup, with our continuous feed facing head.

No. 3—Vertical Mounting—There are no overhead obstructions on a horizontal boring machine to interfere with workpieces. After setting up the connecting rod shown, boring and threading operations were simplified by using a continuous feed facing head.

It would be impractical to mount and machine such work on any other type of equipment. Probably you have been confronted with similar problems. Experienced G. & L. engineers will be glad to help you solve your machining problems without obligation.

Additional Data

...covering the complete line of Giddings and Lewis machines and time-saving accessories is included in this catalog. Write for your copy today—please indicate your business connection. Ask for Bulletin No. TE 84.

GIDDINGS & LEWIS MACHINE TOOL CO.

[illegible] DOTY STREET, FOND DU LAC, WISCONSIN

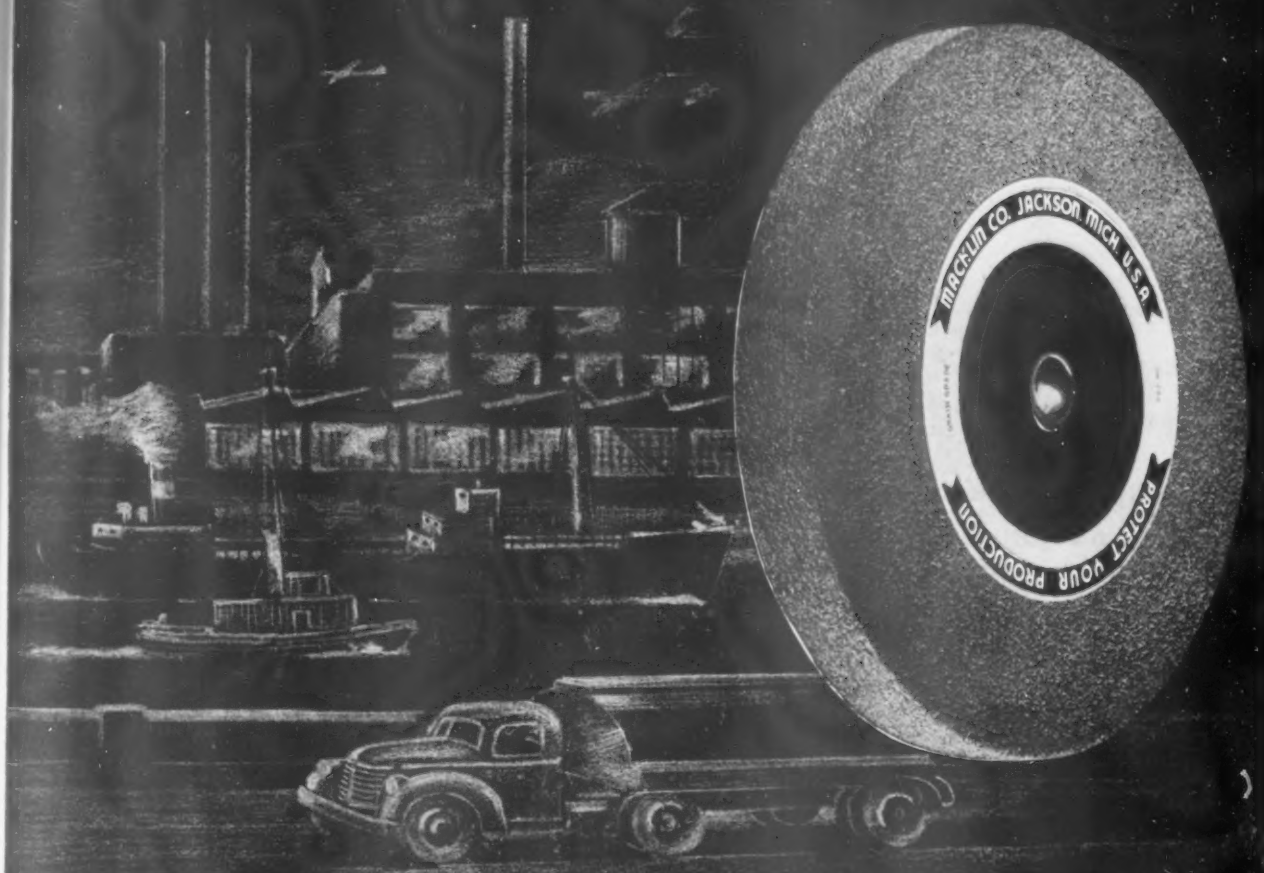
Macklin Resinoid Cut-off Wheels are available for every Cut-off operation. They cut fast and cool, slicing their way through the hardest of metals with minimum wheel wear.

MACKLIN

MACKLIN HIGH QUALITY WHEELS FOR EVERY GRINDING PURPOSE WILL

"Protect your Production"

Ask for the services of a Macklin Field Engineer

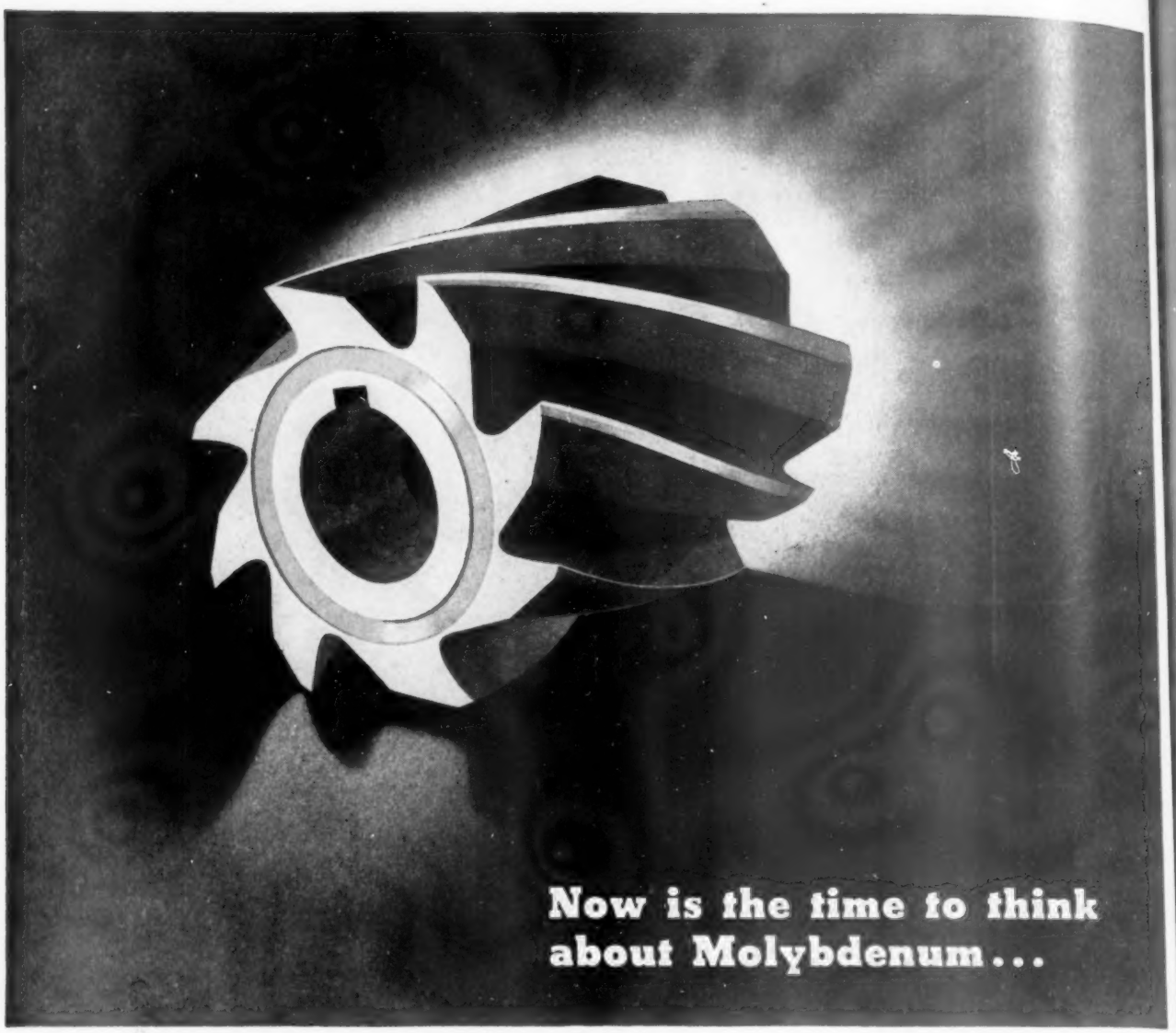


MACKLIN COMPANY

Manufacturers of GRINDING WHEELS — JACKSON, MICHIGAN, U. S. A.

Distributors in all principal cities

Sales Offices: — Chicago - New York - Detroit - Pittsburgh - Cleveland - Cincinnati - Milwaukee - Philadelphia



It is generally appreciated that the item of perishable tool costs is an important factor in manufacturing accounting. The possibility of savings offered by using molybdenum high speed steels, instead of tungsten types, is therefore worth consideration.

The savings are due first to the lower cost per pound of molybdenum steels, and second to their lower density. The latter results in more tools from an equivalent poundage.

The net savings effected naturally depend on tool performance. It is an established fact that, in a substantial majority of careful comparative tests made in the past, the performance of properly heat-treated molybdenum steels equaled, where it did not better, that of tungsten steels.

A consultation with your supplier should confirm these statements, but it would be a simple matter to check them in your own plant.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

ARMY E NAVY

MOLYBDIC OXIDE, BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"

Climax Molybdenum Company

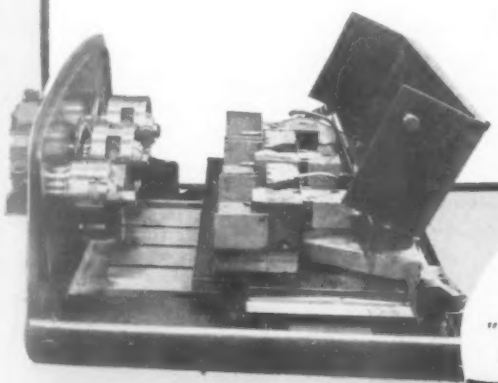
500 Fifth Avenue · New York City

MOLY

Get Maximum Cutting Efficiency
WITH VERSATILE HEALD BORE-MATICS

*V.F.3

FOR ALL JOBS—
ALL OPERATIONS—
ALL MATERIALS! Single-point tools are extensively employed for borizing operations on Heald Bore-Matics, cutting being done in a generated action. Broadnose tools and form tools are also used, often in conjunction with single-point tools, tool action being plunge cut. In addition to these tools, drills and reamers also can be effectively employed. Tools can be rotated in a fixed sweep by boring heads, can be rotated and simultaneously fed radially by rotating tool slides or can be rotated with cam control for contour operations; tools also can be mounted in tool blocks on the table, on cross-slides, or on angular slides for longitudinal tool travel, cross-feeding or angular movement. Cross-slides also provide means of indexing tools and tool retraction. Still another possibility are rotary tool blocks for spherical boring and turning. Any one of these tooling methods can be used separately or all of them can be combined for multiple operations on a single Bore-Matic. For more information, write...The Heald Machine Co., Worcester 6, Mass., U.S.A.



LOOK FOR
*V. F.
"VERSATILITY FACTOR"
in your Post War Tools
V. F. 1 — Application
V. F. 2 — Function
V. F. 3 — Tooling
V. F. 4 — Fixtures

*THIS IS TOOLING VERSATILITY

Tooling of Heald Bore-Matics is specially designed to meet the specific requirements of each job. Versatile basic design makes possible almost limitless tooling combinations. Shown left is a Heald No. 47A Bore-Matic tooled up to drill, face, turn, chamfer and bore gear blanks.

HEALD *Bore-Matics*
THE MOST VERSATILE MACHINE TOOL

BY PLAN-O-MILL • PIONEERED BY PLAN-O-MILL • PIONEERED BY PLAN-O-MILL • PIONEERED BY PLAN-O-MILL • PIONEERED BY PLAN-O-MILL • PIONEERED BY PLAN-O-MILL • PIONEER
IY PLAN-O-MILL • PIONEERED BY PLAN-O-MILL • PIONEERED BY PLAN-O-MILL • PIONEERED BY PLAN-O-MILL • PIONEERED BY PLAN-O-MILL • PIONEERED B

The Sunnen Precision Honing Machine ... with New Coolant Pump and Base –

Provides GREATER HONING SPEED and ACCURACY

With the addition of a new base that contains a pump for supplying honing fluid, the Sunnen Precision Honing Machine is setting new standards of accuracy. Honing is faster, too. The honing fluid carries away all cuttings, keeps the abrasive stone sharp, and cools the part being honed.

With the Sunnen Precision Honing Machine, accuracy is guaranteed to be within .0001"— and has been held to .000025". A super-smooth finish can be produced. On certain types of metal, a finish of 2 to 3 micro inches can be obtained.

- **Hones and finishes cylinders from .185" to 2.625" in diameter**
- **Can be used in either ferrous or non-ferrous metals — plastics — ceramics, etc.**
- **Does not require skilled labor**
- **No jigs or fixtures needed**
- **Economical to operate**
- **Can be set up to operate in one minute**

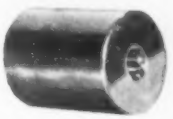
Write for a free bulletin giving details about this low-cost honing machine — or ask a Sunnen engineer to show you how it can be used on your jobs.

The coveted Army-Navy "E" waves over the Sunnen plant — evidence of the important part Sunnen equipment is playing in the war effort.

SUNNEN

Typical Jobs

Aircraft Hydraulic Brake Cylinder. Honing 3 times faster than lapping — and gave a straighter hole.



Header Die. Life of header dies increased 3 to 9 times over lapping. Knock out pin breakage practically eliminated.

Aircraft Instrument Panel Control Wire Bushing. Hole .187" diameter — held to .0002", stock removal .001", sixty per hour.

Aircraft Piston Pin. Sunnen honing is twice as fast and gives a cleaner, better looking pin.

Stainless Steel Load Compensator Valve Seat. Hole is honed to .0002" limit

Aircraft Valve Tappet Roller. Honed after grinding to give 100% bearing surface.

Aircraft Carbureter Operating Valve Sleeve. Sunnen honing eliminates distortion from assembling operation.

Automobile Distributor Shaft Gears. Taper removed at a rate of 80-90 per hour.

Roller Bearing Outer Race. Finish improved from 12 micro-inches to 2 micro-inches.

Bearing. A very small part. 2 micro-inch finish necessary.

Carbureter Idler Valve Jet. Hole is honed after reaming for smooth action.

Shell Loading Die

Cast Iron Valve Stem Guide. ½ to one thousandth removed — 220 pieces per hour. Better finish and straighter hole.

Hydraulic Control Bushing. Honing gives straight round hole after rough reaming.

SUNNEN PRODUCTS COMPANY, 7932 Manchester Avenue, St. Louis 17, Missouri

Canadian Factory: Chatham, Ontario

The CONE AUTOMATIC MACHINE COMPANY sees many GOOD THINGS AHEAD

It is reported that . . . . . .

Vibrating chisels, similar to those used to break up pavements, are being tried out by dentists as an improvement over the familiar drill.

get ready with CONE for tomorrow

The rare metal, tantalum, unknown forty years ago, is being used in bolts, screws, and plates to repair the broken bones of wounded soldiers.

get ready with CONE for tomorrow

A gas-filled fuse, now used to detonate mines, will explode a charge three and one-half miles away in one second. It can be used under water and is itself a powerful explosive. Laid in a line cross-country, it will instantly clear a path through trees and brush or dig trenches.

get ready with CONE for tomorrow

A low priced ultraviolet lamp bulb is ready for the after-the-war market.

get ready with CONE for tomorrow

A noted aviation engineer and successful industrialist has plans for a revolutionary helicopter that uses a contra-rotating propeller, carries four passengers, and can be operated on a highway.

get ready with CONE for tomorrow

A new heat-resistant alloy is reported that uses silicon and manganese to replace part of the scarce nickel and chromium formerly used.

get ready with CONE for tomorrow

Fireproof cotton batting is now being made for upholstery and insulation.

get ready with CONE for tomorrow

A new iron is being made which has as much as five times the tensile strength of ordinary cast iron. With it, even cast iron springs can be made.

A plant has been built for processing large quantities of the lowly milkweed. The floss is a good substitute for kapok in upholstery, an oil for paint is made from the seeds, wallboard can be made from the stalks, and latex extracted from the leaves.

get ready with CONE for tomorrow

A new machine checks the size of ball bearings at rates as high as 20,000 per hour.

get ready with CONE for tomorrow

New sleeping cars have a triple deck arrangement of berths.

get ready with CONE for tomorrow

The "electric eye" can now be used to detect and warn of dangerous gases in the air.

First post-war models of television sight and sound receivers are expected to sell at from $200 to $700. Reception will about equal in quality the familiar 16 mm. motion pictures.

get ready with CONE for tomorrow

A new cream protects those of our Navy who are exposed to the risk of flash burns.

get ready with CONE for tomorrow

Coilsprings of Nylon, while not as strong as steel, will function indefinitely without breaking from "fatigue."

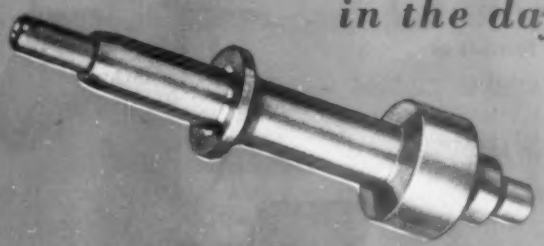
get ready with CONE for tomorrow

A new rubber sheeting perforated with 6,400 holes to the square inch is being used for filters.

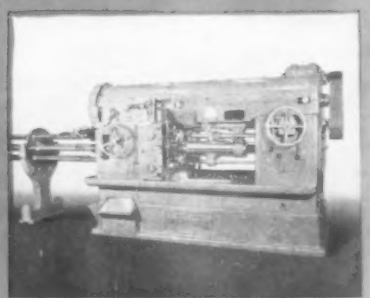
get ready with CONE for tomorrow

A new microscope converts an invisible ultra-violet image into a visible full color picture without the use of photography or fluorescent screens.

You'll need production like this in the days AHEAD



THIS speedometer pinion blank is made of cold rolled steel and has a hole 1" deep in one end. It is produced in 10 seconds on a 6-Spindle Conomatic.



CONE

AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U. S. A.

3

CENTERLESS GRINDING REACHES NEW PRODUCTION HIGH With Special SAFETY GRINDING WHEELS

It's a fact that when SAFETY Grinding Wheels are used for centerless grinding, mass production of intricate parts for war and other instruments is made more practical and economical.

And the reason is that there's a SAFETY Wheel exactly fitted for the job it is intended to do. In this connection, remember that SAFETY specifications are absolutely reliable and dependable, an important factor when grit, porosity and grade of hardness are prime considerations in the centerless grinding of a particular part. The uniformity of SAFETY Centerless Grinding Wheels and years of experimentation in this particular field bring the user the highest quality product and the assurance that war-time production schedules can be maintained.

SAFETY Grinding Wheel Service

If you desire the most efficient centerless grinding set-up for your plant, consult with SAFETY Grinding Wheel Engineers. This costs you nothing, involves no obligation, and will result in giving your plant's grinding wheels increased production. Any of the offices listed below will give you prompt action if you get in touch with them, or with our factory direct.

THE SAFETY GRINDING WHEEL AND MACHINE COMPANY

MAIN OFFICE AND FACTORY SPRINGFIELD, OHIO, PHONE 4651

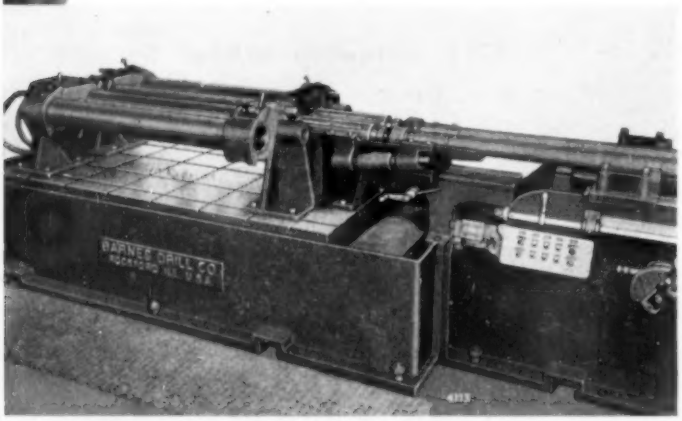
● SALES OFFICE ★ SALES OFFICE and WAREHOUSE

● Birmingham—3-3323 ★ Chicago—TRIangle 8308 ★ Cleveland—EXpress 1445 ★ Detroit—TOwnsend 8-4740
★ Pittsburgh—COurt 2822 ★ Erie—23-093 ★ Philadelphia—WAlnut 3132 ★ St. Louis—CEntral 3676
● Birmingham—3-3323 ★ Chicago—TRIangle 8308 ★ Cleveland—EXpress 1445

(Above) BARNESDRILL No. 30 Horizontal Hydraulically Reciprocated Honing Machine with 76 feet spindle stroke for honing up to 42" diameter. Note hone cradle and the four traveling supports for the driving bar.

(Right) Interior of 2¼" bore in Di-Hard tubing. The circles of light would reveal the inaccuracies or out-of-round condition. Here the natural circles of light are perfect after honing.

● The honing of bores of long cylinders, such as oil well working barrels, gun barrels and other long cylindrical parts, produces a smoothness unobtainable by any other machining method. Barnes Drill Co. has developed a line of horizontal honers capable of operating on workpieces of great length, yet occupying a minimum of floor space and efficiently meeting every essential feature necessary for accurate honing. These horizontal honers are available in several sizes and various lengths according to the class of work to be honed. BARNESDRILL machines have been furnished for honing hydraulic cylinders and other large tubing up to 76 feet in length and diameters up to 42".



(Above) BARNESDRILL two spindle No. 6 Horizontal Honing and Straight Line Lapping Machine, with adjustable or elevating duplex cradle. Two hydraulic cylinders are being honed simultaneously while two more are reloaded in spare stations.

In addition to providing a smooth finish free from damaging scratches, but accurate within very close tolerances, honing provides the fastest, most economical method of finishing long work. A gun tube 5" in diameter, 23 feet long, can be honed with a stock removal of .014" from the diameter per hour. On another 90 mm. tube 13½ feet long, .018" of stock was removed in 1½ hours. It required only 45 minutes to remove .050" of stock from a recuperator cylinder 52" long x 4½" diameter. These are but a few examples of production honing with BARNESDRILL Horizontal Honers.

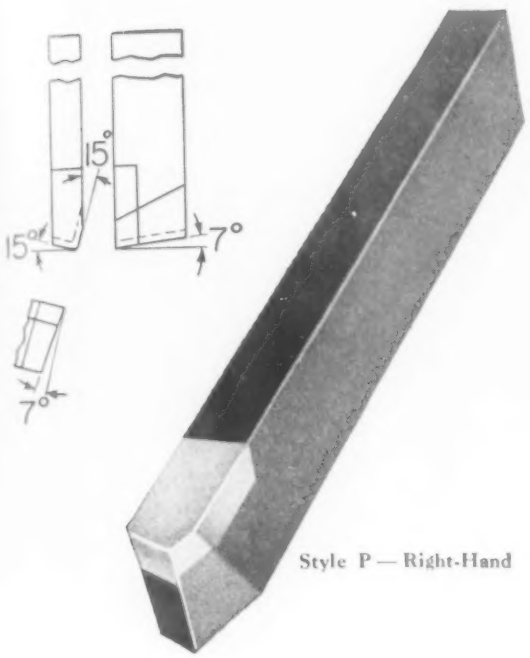
If you have extra long cylinder bores to finish, consult BARNESDRILL engineers for their recommendations as to the proper honing machine for your work. There is no obligation for this service.

Additional Data

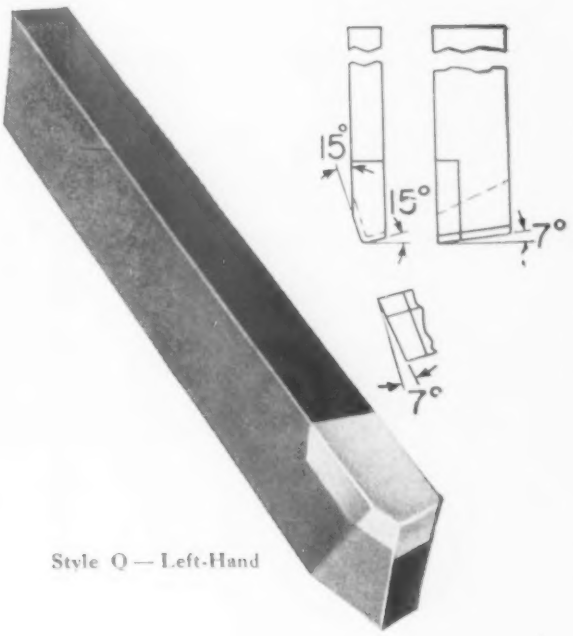
For more complete details and specifications on BARNESDRILL Horizontal and Vertical Honing Machines, write for free copy of Bulletin No. T-135.

Barnes Drill Co. 848-71 CHESTNUT STREET ROCKFORD ILLINOIS, U.S.A.

TWO NEW HAYNES STELLITE 98M2-TIPPED TOOLS *Designed For Machining Steel*



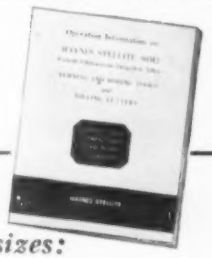
Style P — Right-Hand



Style Q — Left-Hand

●Two new styles of HAYNES STELLITE 98M2-tipped tools especially designed for machining steel are now available. These tools, designated as Style P and Style Q, consist of a cutting tip of HAYNES STELLITE 98M2 cobalt-base alloy brazed or butt-welded to a tough steel shank, with correct clearance and lead angles ground for turning steel, but with the tool tops flat so that users can grind their own side-rake angle for each particular job.

For more information on how these and other HAYNES STELLITE tools — tipped or solid — can be used to increase production at lower cost per piece machined, write for the booklet, "Operating Information on Haynes Stellite 98M2 Tools." Ask for Form 5350.



These new tools are stocked in five shank sizes:

⅝ x 1¼ x 8 in.
¾ x 1½ x 9 in.
1 x 1 x 7 in.
1 x 1¼ x 7 in.
1¼ x 1¼ x 7 in.

HAYNES STELLITE TRADE-MARK

HAYNES STELLITE COMPANY

Unit of Union Carbide and Carbon Corporation

General Office and Works UCC Kokomo, Indiana

Chicago—Cleveland—Detroit—Houston—Los Angeles—New York—San Francisco—Tulsa

BUY UNITED STATES WAR BONDS AND STAMPS

• HIGH-PRODUCTION METAL-CUTTING TOOLS •

"Haynes Stellite" is a registered trade-mark of Haynes Stellite Company.

It's New — a COMPARATOR with MICROMETER HEAD and DIAL INDICATOR

YOU SET IT DIRECTLY WITHOUT MASTERS

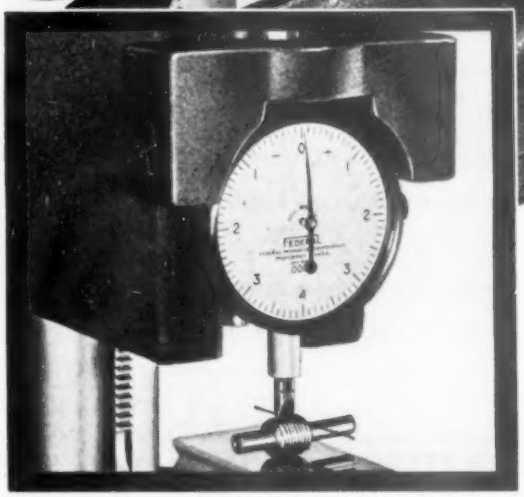
The combination Micrometer and Dial Indicator Head incorporates its own Master. A complete set of Gage blocks, or masters, are not necessary. You simply set the micrometer to the required dimension, lock it, and then compare workpieces, etc.

MODEL 120 B-1

This comparator is very convenient for tool rooms and shops having miscellaneous job lots of duplicate workpieces. Anvil has both smooth and serrated surface.

THREE-WIRE THREAD MEASURING

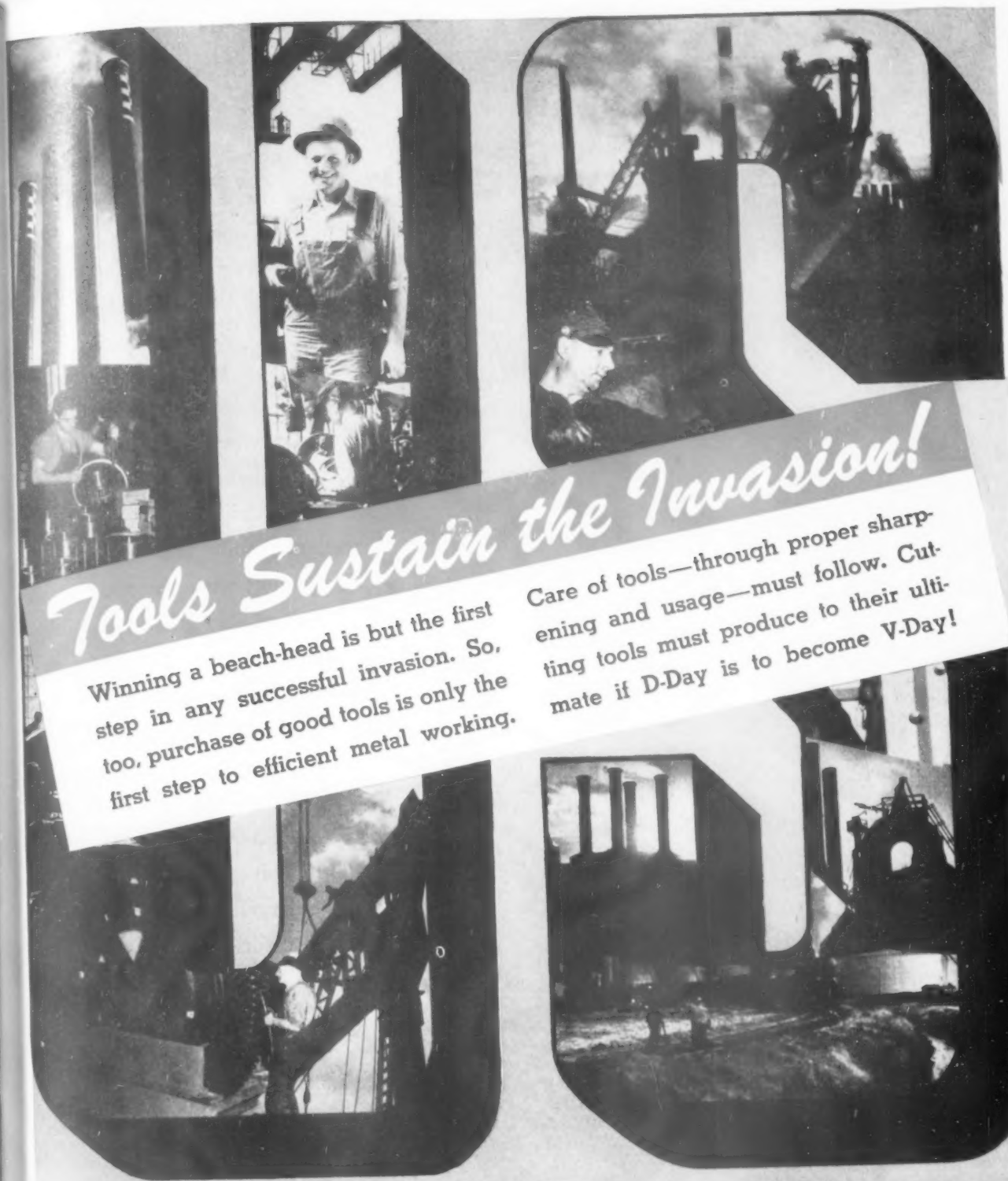
is easy on this new comparator because the Micrometer Head enables you to read the actual dimension of the Pitch Diameter. The Dial Indicator then compares the diameters of other similar screw threads. The weight over the Indicator is for coarse threads.



FEDERAL PRODUCTS CORPORATION · 1144 Eddy St., Providence, R. I.

★ ★ ★ ★ ★ **FEDERAL** ★ ★ ★ ★ ★

PRECISION MEASURING INSTRUMENTS



Tools Sustain the Invasion!

Winning a beach-head is but the first step in any successful invasion. So, too, purchase of good tools is only the first step to efficient metal working.

Care of tools—through proper sharpening and usage—must follow. Cutting tools must produce to their ultimate if D-Day is to become V-Day!

National cutting tools, sold by leading Mill Supply Distributors, are tools of character.

NATIONAL

NATIONAL TWIST DRILL & TOOL ROCHESTER, MICH. U.S.A.

TWIST DRILLS
REAMERS, HOBS
MILLING CUTTERS
COUNTERBORES
SPECIAL TOOLS

TWIST DRILL AND TOOL COMPANY

DETROIT AND ROCHESTER, MICHIGAN

Tap and Die Division—Winter Brothers Co., Wrentham, Mass.

Factory Branches • New York • Chicago • Cleveland • San Francisco • Distributors in Principal Cities

GAGES
from a fine family

Two things you look for when selecting Gages—initial accuracy and maintained accuracy.

Gages bearing the PM Diamond Emblem qualify on both of these excellent family characteristics.

Beginning with the right steel, we machine and grind to the high standards demanded by today's precision work, and then finish to insure long life in service.

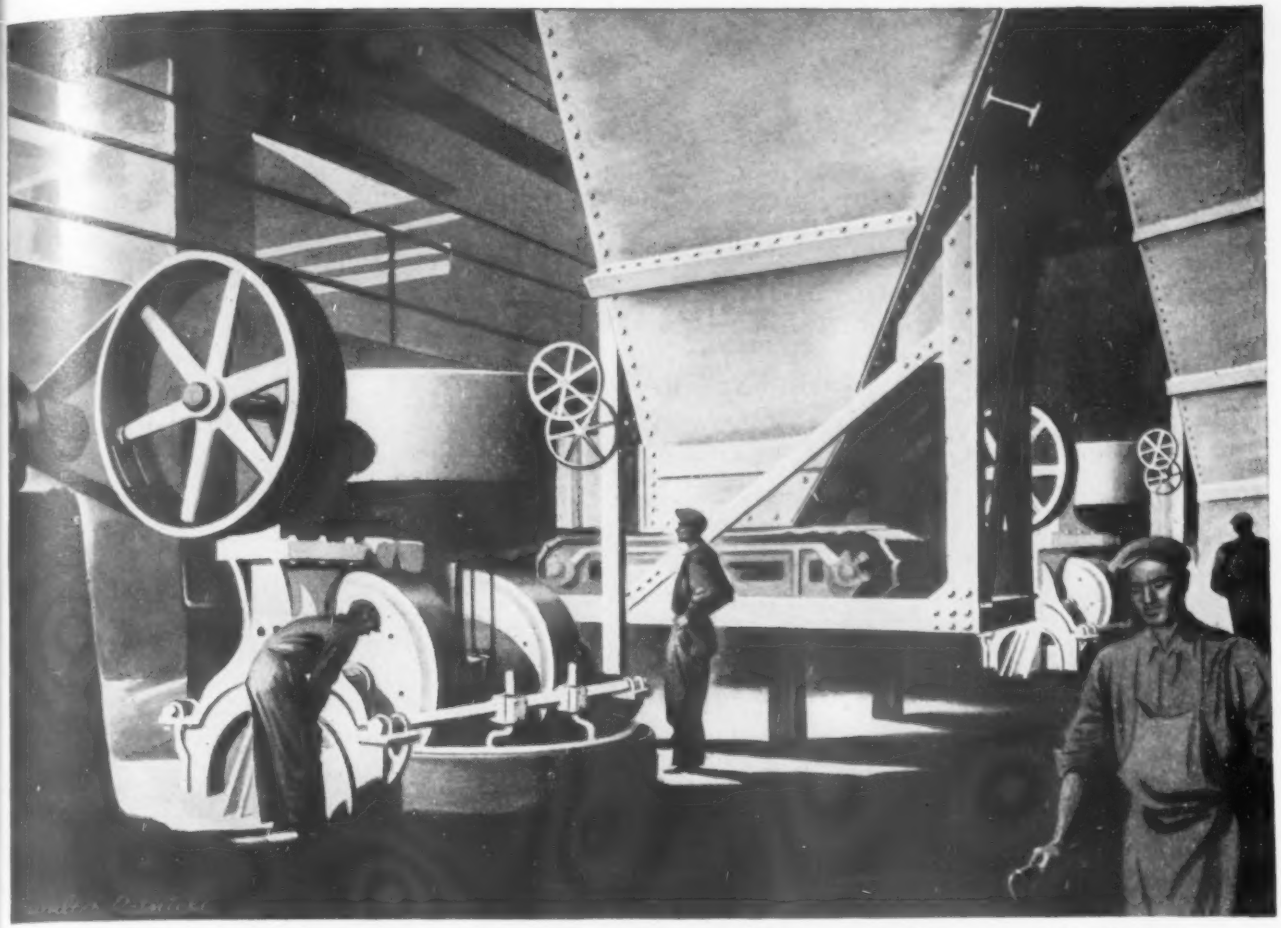
Pipe Machinery maintains a large stock of standard Plug, Ring and Thread Gages, from which prompt shipments are made to meet emergencies. Wire Department EX for this quick delivery service.

Special Gages and Cutting Tools are engineered by experts and built on special order. Send us details of what you want to accomplish.

ARMY E NAVY

The PIPE MACHINERY COMPANY Cleveland, O.

GAGES • HOBS • MILLING CUTTERS • SPECIAL TOOLS



In ceramic production Stainless Steels, Nickel, Monel, and Nickel Alloyed Castings are used in many special applications.

NICKEL AIDS THE CERAMIC INDUSTRY

to KEEP 'EM PRODUCING!

Many Ceramic engineers and plant operators have found it necessary skillfully to integrate the best in methods and machines to achieve wartime production.

They made the refractories branch of the industry a War Giant that's striding forward with massive output for keeping metal going on its way to war. In critical war production areas building brick for plant expansions and cement for roads on which millions travel to their wartime tasks have been available in ample quantity and on time.

No essential industry has lacked supplies of ceramics.

An important aspect in this achievement is the utilization of Nickel Cast Irons, Stainless Steels, Monel and other alloys containing Nickel... to combat the ravages of heat, corrosion and abrasion.

To minimize attendant interruptions of production, ceramic engineers... relying on their long peacetime experience with metals and alloys... made the judicious choice of Nickel alloys.

Their experience had shown them that a little Nickel goes a long way to keep equipment producing.

Nickel imparts hardness, toughness, strength and wear resistance. It fortifies crusher rolls, scrapers and other critical parts of production equipment. Nickel is specified widely in processing mechanisms... such as muller tires, scraper blades, pug mill knives, chute liners and all manner of parts subject to severe abrasive action. Nickel alloyed parts provide long service life... reducing the need for frequent replacement. Thus it is practical for plant operators to increase output and general efficiency... and all this at a very reasonable cost.

For many years it has been our privilege to cooperate with foundrymen and engineers who desired help in the selection, fabrication and heat treatment of alloys. If you'd like to have such assistance... whatever your industry may be... counsel and data are available on request.

Catalog "C"

makes it easy for you to get booklets and bulletins on industrial applications of Nickel, metallurgical data and working instructions. Why not send for your copy today?

* Nickel *

THE INTERNATIONAL NICKEL COMPANY, INC., *67 Wall St., New York 5, N. Y.*

Equipped with Self-Indexing Hexagon Turret

Oster developed the "RAPIDUCTION" Lathe to meet a widespread demand for a SIMPLIFIED machine whose maximum efficiency is not dependent upon highly skilled operators.

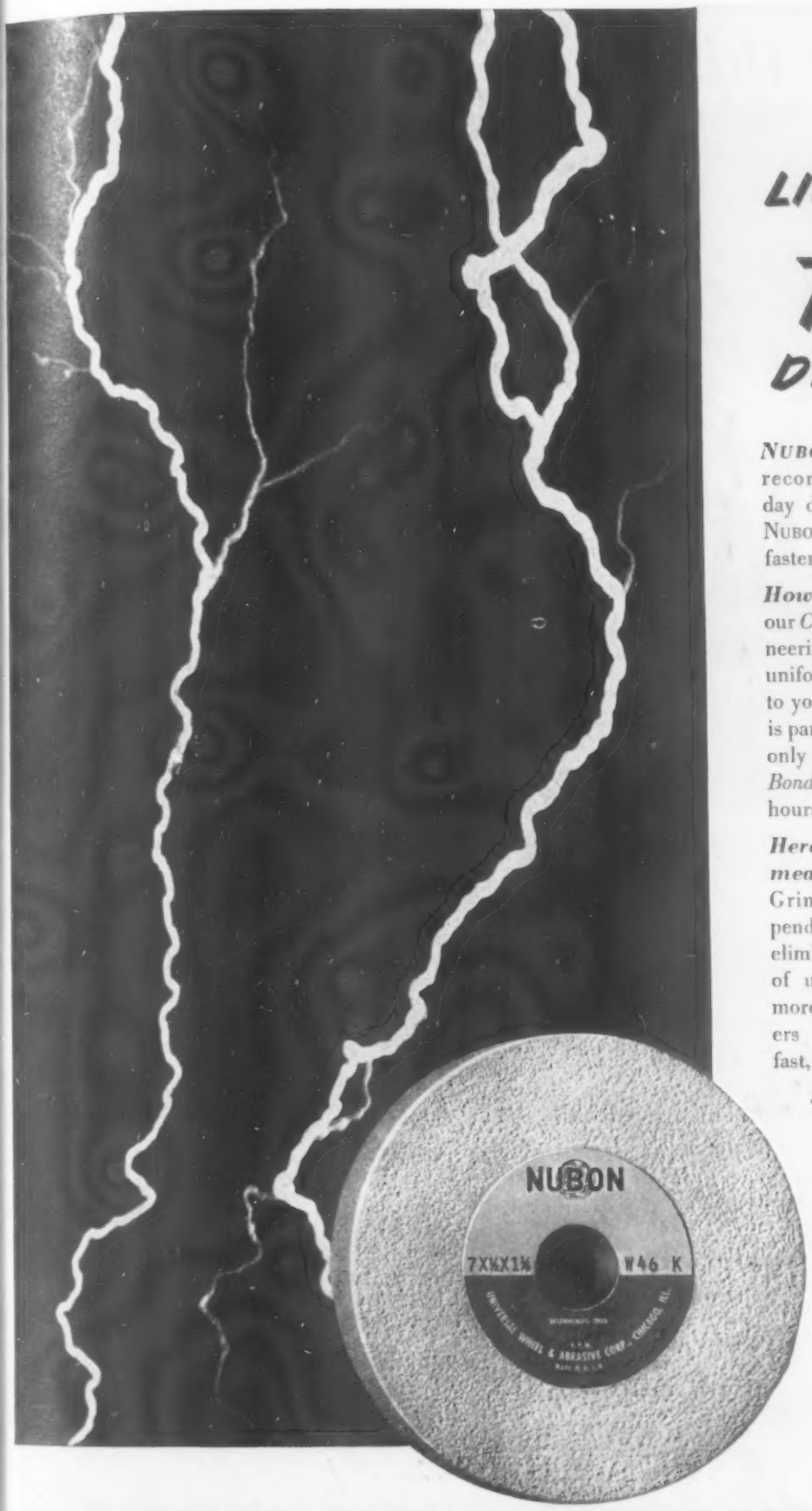
The successful performance of Oster "RAPIDUCTION" Lathes on a variety of bar and chucking operations created an increasing demand for these machines which continues to make it difficult to accept orders for prompt deliveries.

Our dealers are prepared to explain the many advantages of Oster "RAPIDUCTION" Lathes and advise you of the current status of shipments.

OSTER

"Rapiduction" LATHES

THE OSTER MANUFACTURING COMPANY, 2063 EAST 61st ST., CLEVELAND 3, OHIO, U. S. A.



LIGHTNING *fast* DELIVERY

NUBON service is smashing all records—with guaranteed 10-day delivery of precision-built NUBON Grinding Wheels—even faster service in emergencies!

How are we doing it?—By our *Controlled Trial Plan* of engineering which assures accurate, uniform Grinding Wheels built to your specifications. Our plant is part of your laboratory! That's only half the story. Our *Special Bonding Process* saves precious hours in processing time.

Here's what NUBON service means to you: CUSTOM-MADE Grinding Wheels you can depend on, when you need them; elimination of big inventories of useless wheels. No wonder more and more industrial leaders are turning to NUBON for fast, dependable service.

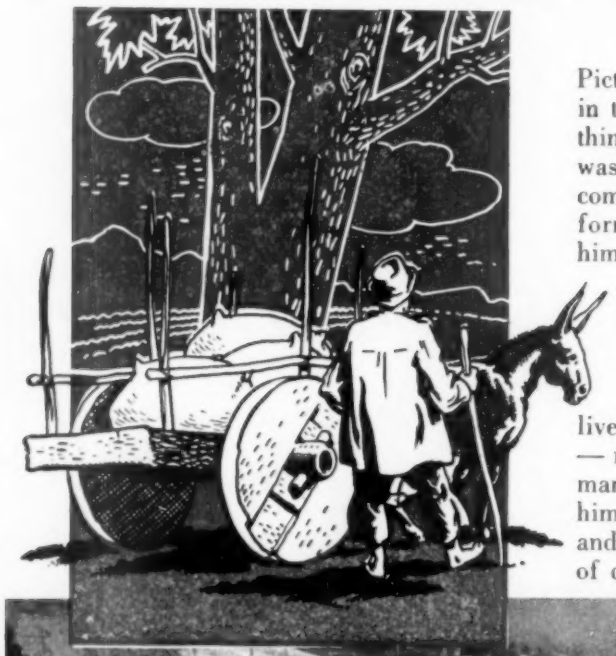
Send for your copy of our catalog.

NUBON 24 HOUR PROCESS GRINDING WHEELS AND STONES

UNIVERSAL WHEEL & ABRASIVE CORP.

2626 West Van Buren Street, Chicago 12, Illinois

what has this to do with broaching?



THAT depends upon how you look at it. Pictured here is a crude, two wheeled cart, still used in transportation. The wheel is a pretty commonplace thing these days — yet the wheel, as time has proved, was one of the most revolutionary inventions for the comfort and convenience of Man. In its rudimentary form it took heavy loads from Man's back and gave him greater mobility. As a means for utilizing the tremendous energy of falling water, the water wheel harnessed nature to turn other wheels — to grind corn and to power the earlier machines which in turn allowed Man to work *less* . . and produce *more*. Almost unrecognized it exerted a profound influence on our lives and habits. In modern streamlined transportation — railroad, automobile, airplane — the wheel enables man to have far greater pleasure in the world about him, vacationing and visiting with friends both near and far. Actually, civilization has sprung from the ruts of countless wheels.

So, too, with Broaching . . . from a primordial type of drilling to present day precision production, Broaching's principles have been amplified until they now cover the entire metal-working field. Just as the use of the wheel expanded from the crude vehicle stage to its present use in diverse sizes and shapes . . . in intricate machinery making countless tools, machines, and vehicles for Man's even greater comfort and convenience . . just so will Broaching become an increasingly powerful influence in making machines to turn out more and better and cheaper products to lessen Man's work and increase the joy of living.

Earliest historical references to Broaching mention use of a toothed tool to form tap holes in wine barrels.

ARMY E NAVY

The LAPOINTE Machine Tool Company

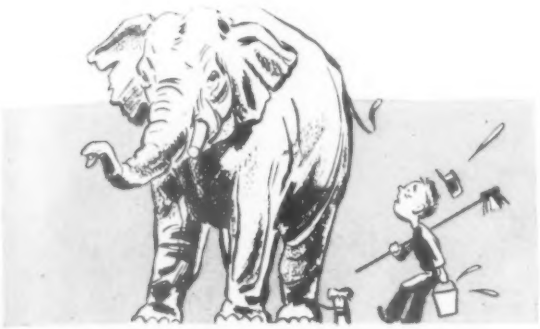
HUDSON, MASSACHUSETTS, U. S. A.

THE WORLD'S LARGEST MANUFACTURERS OF BROACHES AND BROACHING MACHINES

Cutting oil *News* letter

Practical suggestions from the field on how cutting oils and coolants are being used by midwest machine operators to lick tough wartime jobs

AUGUST, 1944



A big washing job was eliminated on bomb ends by a Michigan bomb maker when he shifted to Stanicool H.D. Soluble Oil. A heavy-duty product was needed to get good tool life, tapping 5½"—12 threads in ends of 250 lb. bombs of SAE 1035 forged steel. Stanicool H.D. was the only oil tried that gave desired tool life *plus* easy removal—a valuable time saver because the bomb ends had to be painted.

Automatics old enough to vote were pressed into service by an Illinois war plant. They did the job except that on some of these old machines excessive leakage of bearing oil into the sump diluted the cutting oil at a rapid rate. This in turn materially reduced tool life. The problem was solved without time-taking and expensive machine rebuilding. A Standard Lubrication Engineer suggested adding Acme Base Oil Extra Heavy periodically to the cutting oil. This replenished the compounding, kept up tool life, and eliminated throwing away sump after sump full of oil. It's in emergencies like these that you'll find Standard Lubrication Engineers most helpful.

Jerky action of gun-rifling broaches is often caused by the weight of heavy broach and ram breaking down the lubricating film of ordinary lubricants used on ways. One broach maker found Stanolex 31 just what he needed. Because of the filter used in the system for lubricating the ways, heavy-bodied oils could not be used. Stanolex 31 was light enough in viscosity to be used in the system and tough enough to maintain a lubricating film that gave the ram smooth, even action.

To get good tool life plus a satisfactory finish without grinding, posed a problem for a Michigan plant. The job is produced from 6150 hot rolled steel on a Gridley Automatic. Several cutting oils were tried, but Acme Cutting Oil 110—mixed with 2 parts of paraffin oil—was the only oil that gave good enough finish to eliminate a grinding operation, and at the same time cut tool grinding to twice a shift. This added 15% to a day's production—a lot of parts when one is produced every 28 seconds.

Have you investigated Standard's Coded Lubrication Service—a simple numerical system for getting the *right* lubricant in all the *right* places. Your Standard Industrial Service Representative will be glad to explain it—and tell you how you can put it to work in your plant. Call the local Standard Oil Company (Indiana) office, or write 910 S. Michigan Avenue, Chicago 80, Illinois for the Engineer nearest you. In Nebraska, write Standard Oil Company of Nebraska at Omaha 2.

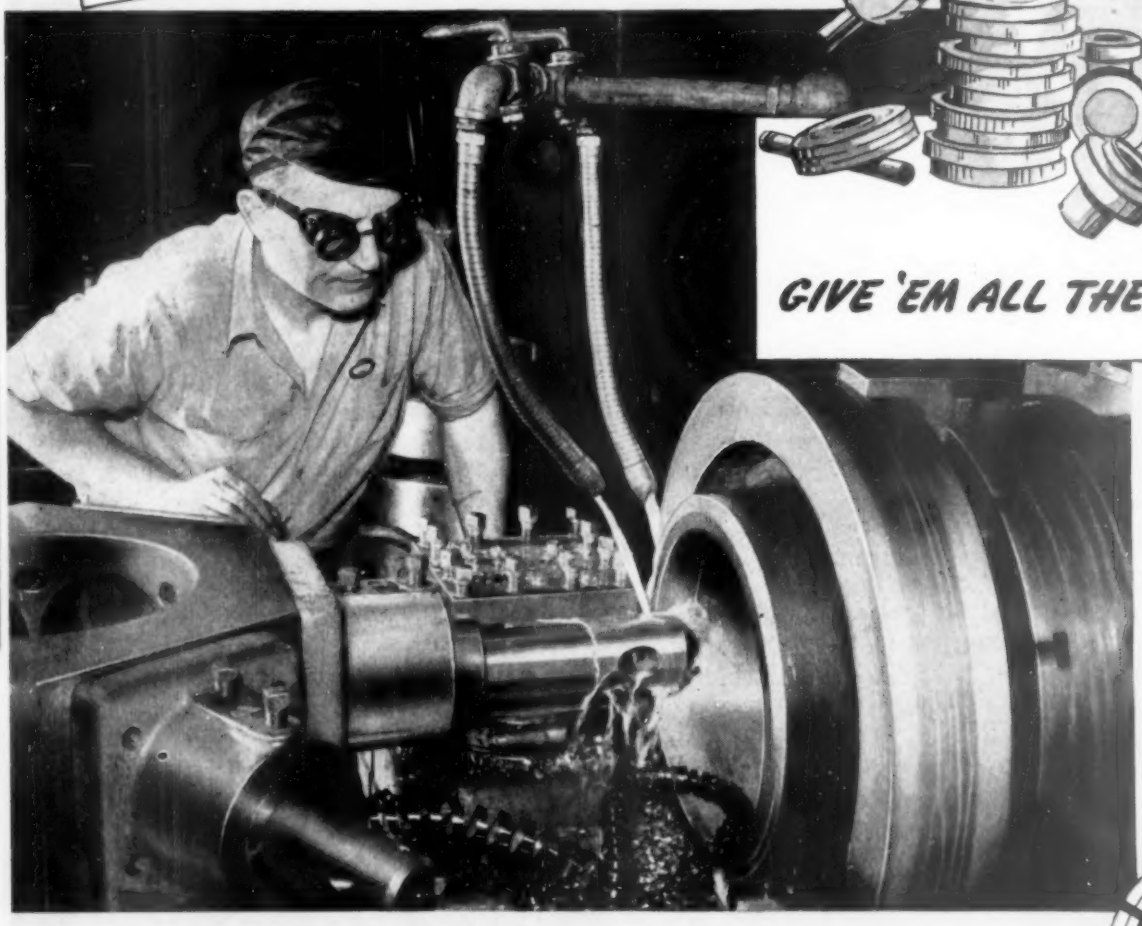
Gasoline Powers the Attack . . . Don't Waste a Drop!

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

LUBRICATION ENGINEERING...LUBRICATION ENGINEERING...LUBRICATION ENGINEERING...LUBRICATI

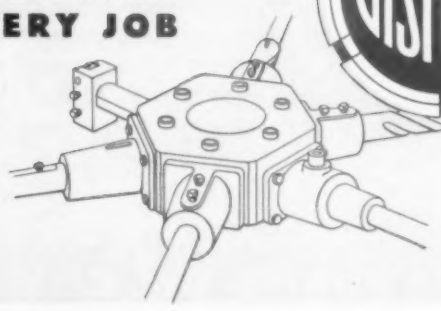
FEEDS
FOR CUTTING TOOLS AREN'T RATIONED!

GIVE 'EM ALL THEY'LL TAKE!



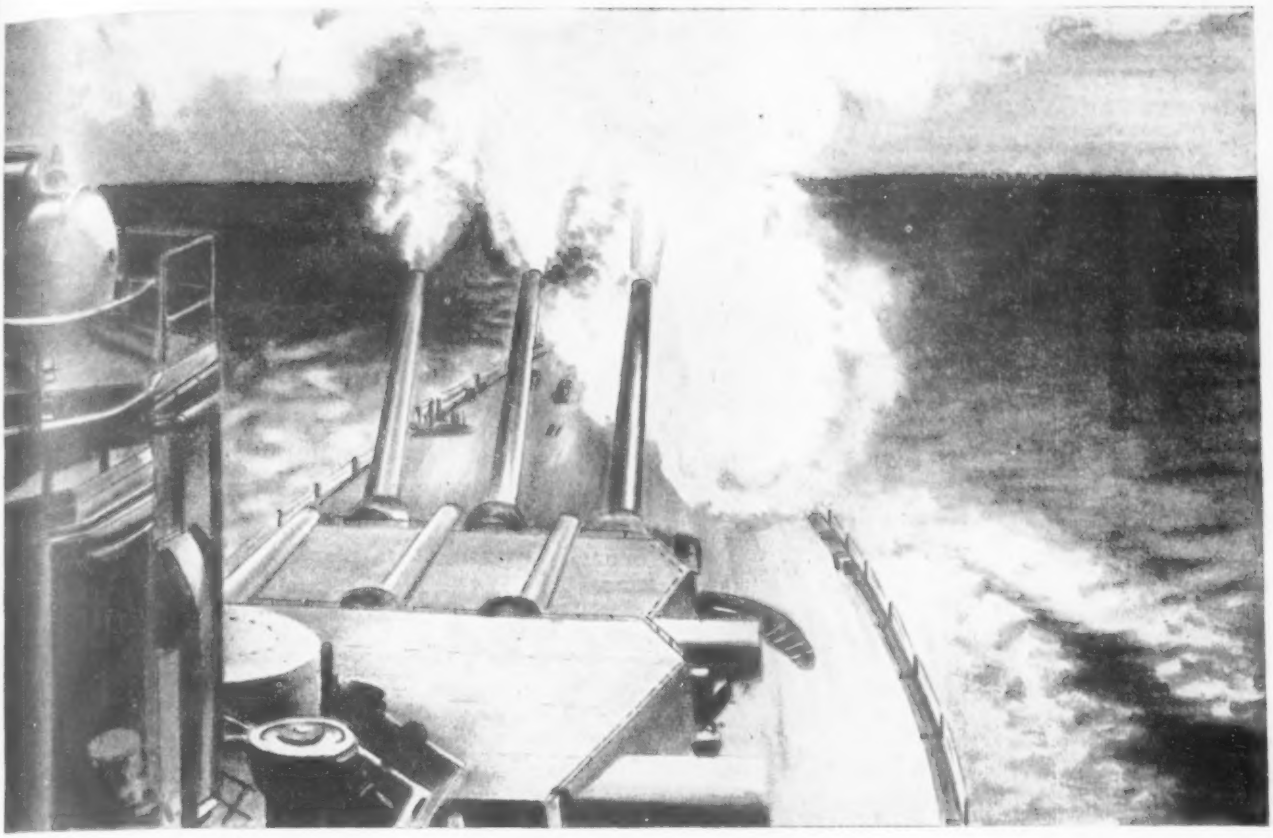
USE THE FASTEST CUTTING SPEEDS AND HEAVIEST FEEDS POSSIBLE, ON EVERY JOB

Good Turret Lathe practice dictates that easily adjusted tools should be run at speeds and feeds that require tool grinding every four hours.



GISHOLT

★ *Reproductions of this page on enameled paper are available for use in your turret lathe departments. Write the Gisholt Machine Company, 1229 East Washington Avenue, Madison 3, Wisconsin. Ask for the series of "Wartime Care and Operation" posters. State quantity desired.*



For Blasting a "Tin Can" Beyond The Horizon

Microhoning Provides Vital Precision Bearings in Wartime Production

A battleship gun turret is a complex precision instrument on a gigantic scale. Each complete turret weighs about 1550 tons. This great mass must not only move smoothly, but also very rapidly—guns must be quickly targeted with extreme precision and without backlash. That calls for something extraordinary in the way of bearings.

They must be dependable and have amazing accuracy. Inaccuracy or the slightest imperfection of operating fit would destroy the telescope precision needed to make each shot count.

The best ordinary machining methods won't provide the precision nor the fine surface finish necessary for accurate frictionless operation.

Microhoning was found to be the answer. Microhoning is a process of final machining which generates average bore accuracy for roundness and straightness within .0002" to .0003"—which removes up to 65 cubic inches of stock per hour. In production of turret bearings—not only for battleships, but also for cruisers and destroyers—Microhoning has provided the desired combined precision and finish.

And, it will be more constructively useful in coming times of peace than it has been in war production.

MICROMATIC
HONE CORPORATION
DETROIT 4, MICHIGAN

MAKERS OF HONING MACHINE TOOLS

Finest PROTECTION

FOR THE *Finest Carbide!*

EASILY removable—leaves no residue—Jacket can be replaced after inspection—provides full protection in transit and in tool rooms—time saver at both ends of supply line.

The Vascoloy-Ramet Plastic Jacket is resilient, waterproof, oil-proof, also corrosion-resistant. It does not become brittle or crack . . . so tough and shock resistant that if a tool dropped on the floor lands on the protected cutting edge, no damage is done!

Plastic Jacket FOR PROTECTION OF VASCOLOY-RAMET CARBIDE and TANTUNG TIPPED TOOLS

In the process, tool tips are dipped in molten ethyl-cellulose . . . a substantial layer of coating is picked up and adheres firmly to the tool by shrinkage as it cools rapidly forming a perfect jacket.

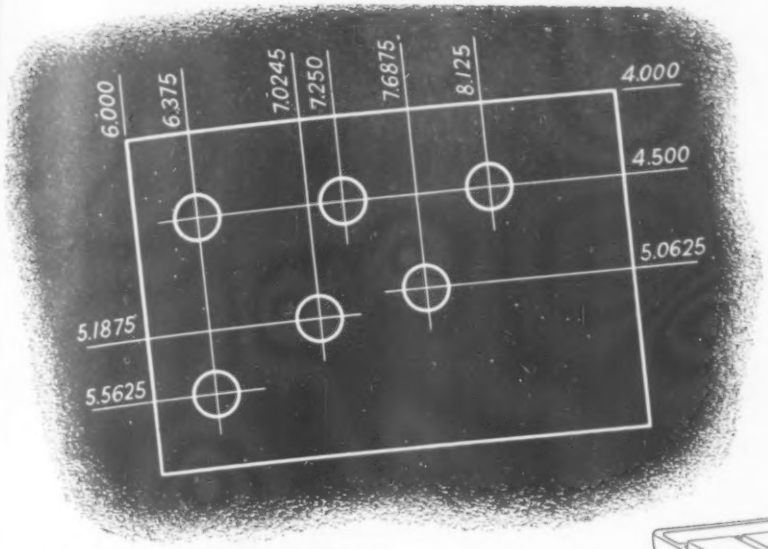
EASILY REMOVABLE—STOCKROOM PROTECTION

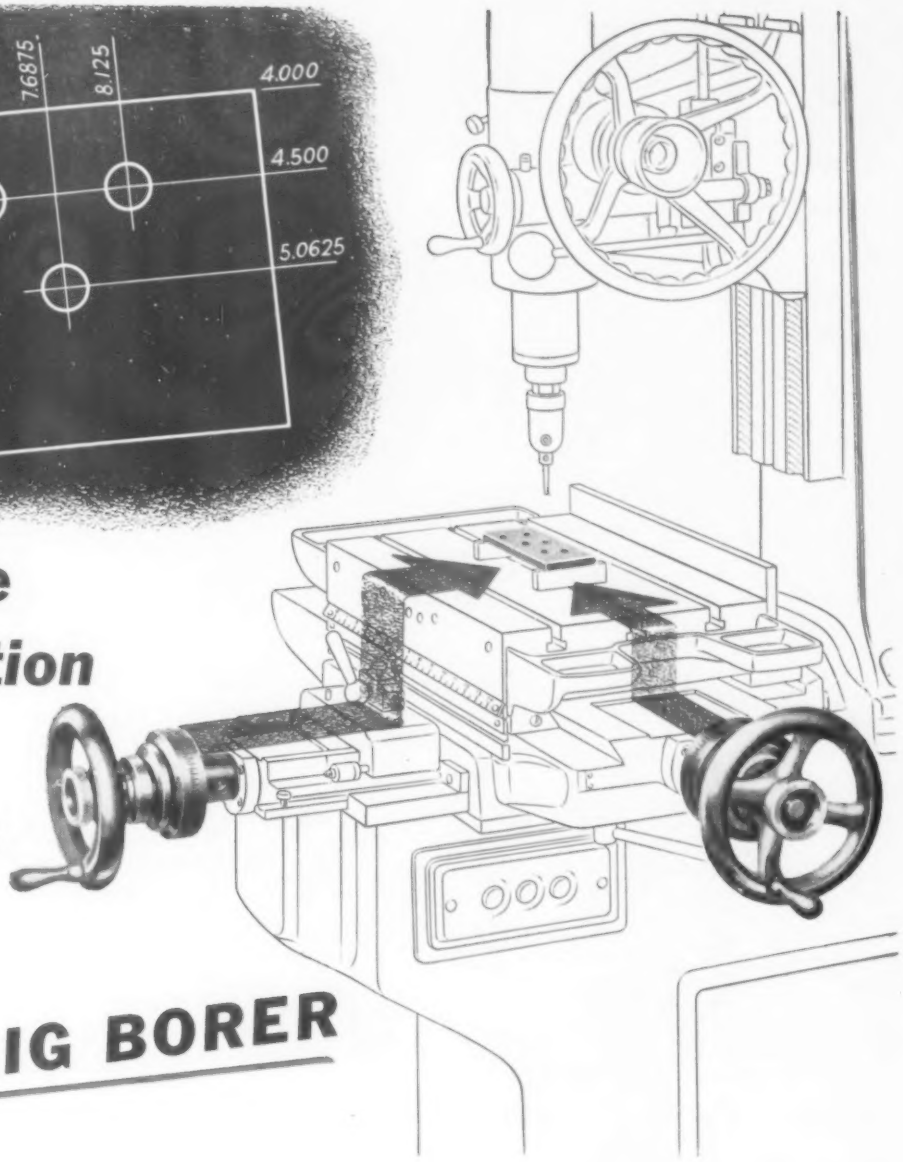
The Jacket is easily removed by slitting with a knife and merely slipping it off the tool—no residue remaining on the metal. After tool inspection, the Jacket may be slipped back on the tool and held in place with adhesive tape. This also protects valuable cutting edges while tools are in the stockroom. The world's finest Carbide Tools merit this protection. No extra cost to the user!

VASCOLOY Ramet RAMET CORPORATION 4462

CARBIDE TOOLS AND TANTUNG CAST ALLOY CUTTING TOOLS

NORTH CHICAGO · ILLINOIS · SALES AND SERVICE IN PRINCIPAL CITIES





Coordinate Hole Location is at your Fingertips in the MOORE JIG BORER

SPOTS • DRILLS • BORES • REAMS
***All* Holes with Minimum Tool Changes**

A glance at your blueprint...a few turns of the lead screws and *all* holes on the work piece are quickly located and spotted—*consecutively, accurately.* It's as simple as that. There's no waiting for tool changeover on each individual hole, for the Moore Jig Borer drills, bores and reams *all* holes in the same rapid sequence with the minimum of tool changes.

Contrast this *built-in* system of coordinate location with the laborious size blocks or graduated scale methods of measurement, plus the continual stop-and-start required with tool changes at every hole. Then compare its production volume on your cost sheets.

Guaranteed to space and bore holes accurately within limits of .00025″ in *any* position of the table, the Moore Jig Borer is ideally suited for jigs, fixtures, dies, gages and special machine parts. It is highly sensitive for holes of 1/32″ diameter yet rugged for heavy cuts up to 4½″—and is ideally suited for jig-less, small-lot production.

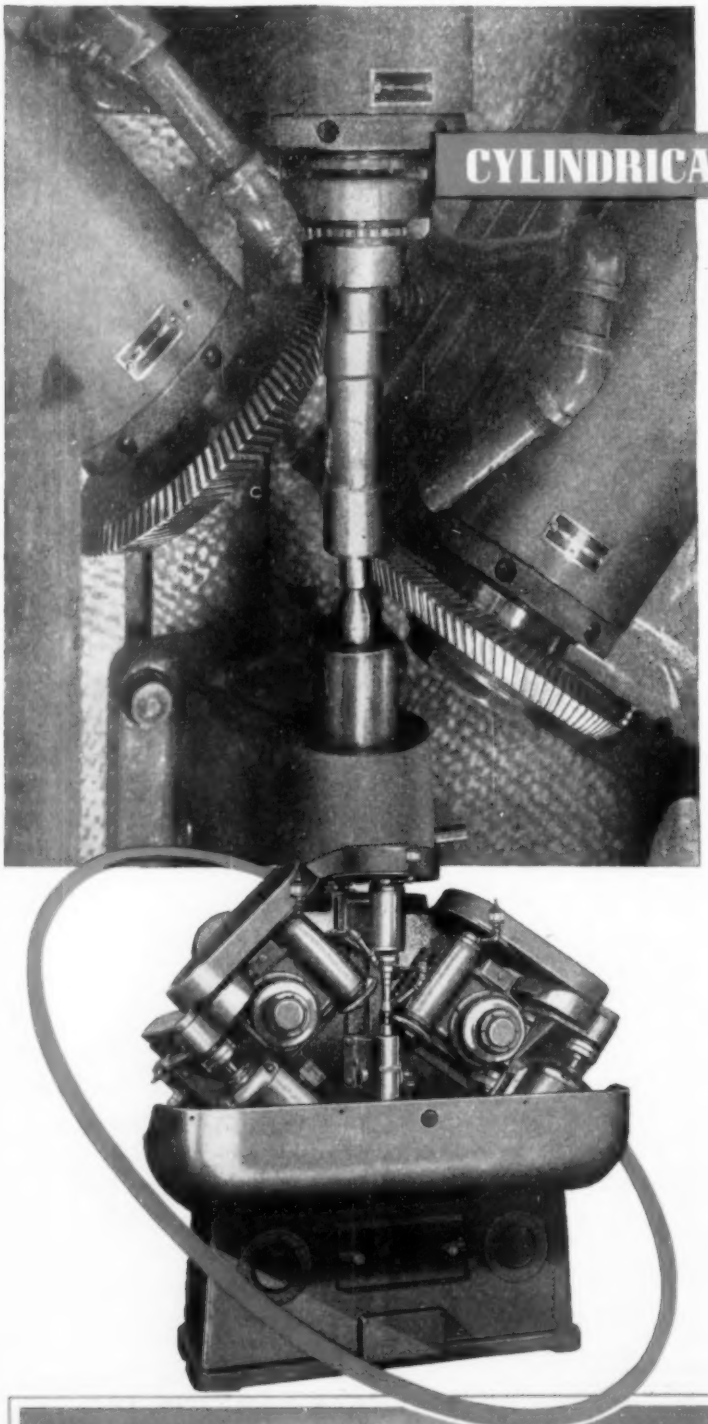
Investigate the advantages of the Moore Jig Borer in your applications. See it in operation at our plant or write for our descriptive literature.

MOORE SPECIAL TOOL COMPANY, INC.
732 Union Avenue, Bridgeport 7, Conn.

MOORE TOOLS

MOORE JIG BORER

ROTO SHAVING



Finishes

CYLINDRICAL and CONICAL SURFACES

Faster and Better

On parts having a hardness of 38 Rockwell or less, Roto Shaving is better than grinding because it is faster, more economical and the finished surfaces can be maintained to a high degree of smoothness. Production rates are about three times that of grinding.

A 100% complete inspection of a lot of 4,000 consecutive pieces reveals a maximum variation of .001″ on the diameters. Stock removed ranges from .010″ to .015″ on the flanges and .020″ on cylindrical diameters.

A special fine pitch milling cutter is used for this work and the work is rotated during the cut but at lower speeds than for grinding. These cutters wear very slowly and may be sharpened on ordinary shop equipment. The gradual wear materially reduces machine adjustments.

NATIONAL BROACH AND MACHINE CO.

RED RING PRODUCTS

3600 ST. JEAN • DETROIT 13, MICH.

Specialists on SPUR AND HELICAL INVOLUTE GEAR PRACTICE

Originators of ROTARY SHAVING AND ELLIPTOID TOOTH FORMS

MACHINE-TOOL TIPS FROM THE TOP-NOTCHERS

"Hob life can be greatly increased by accurate, frequent sharpening"

says: **R. A. HORNER**, Sales Mgr.,
Machine & Small Tool Div.
BARBER-COLMAN CO.,
Rockford, Illinois

The development of the No. 3 Automatic Hob Sharpening Machine by Barber-Colman Company has proved a major contribution to the war effort; made it possible to increase tool life . . . speed up production.

HOBS

"CUTTING TOOLS, hobs especially, have been a mighty hard to get these past months, and it has been the patriotic duty of every tool user to make his tools last as long as possible.

"One of the greatest influences on the length of hob life is the frequency and accuracy with which the hob is resharpened. The more frequently it is sharpened, the less stock must be removed, the longer its life. In addition, a hob is a precision-cutting tool, and must be sharpened to close tolerances; otherwise, it will produce inaccurate forms which are a waste of tool life and material.

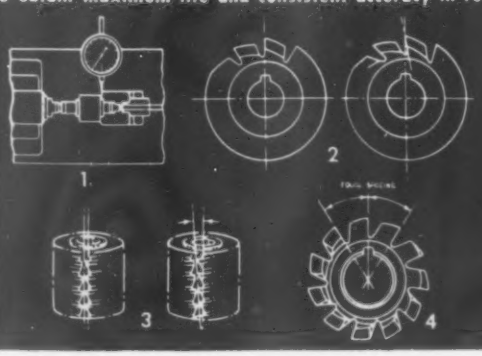
"Mechanically controlled sharpening has proved to be the only satisfactory method for being sure of accuracy and equal stock removal. Evidence of this is the fact that all hob manufacturers use automatic, mechanically controlled sharpening-machines in producing hobs to original precision tolerances.

"And because of its accuracy this machine will keep hobs at their highest cutting efficiency. Its ease and rapidity of operation reduces to a minimum the expense of proper tool maintenance. Since the machine is fully automatic, it insures accurate results regardless of the personal skill of the operator."

* * *

The proper selection of a cutting oil is as important as the proper sharpening of a hob. That's why Shell Lubrication Engineers have developed a control technique that "tailor-makes" the oil to fit the machine, the application, and the tool. Ask the Shell man for the details.

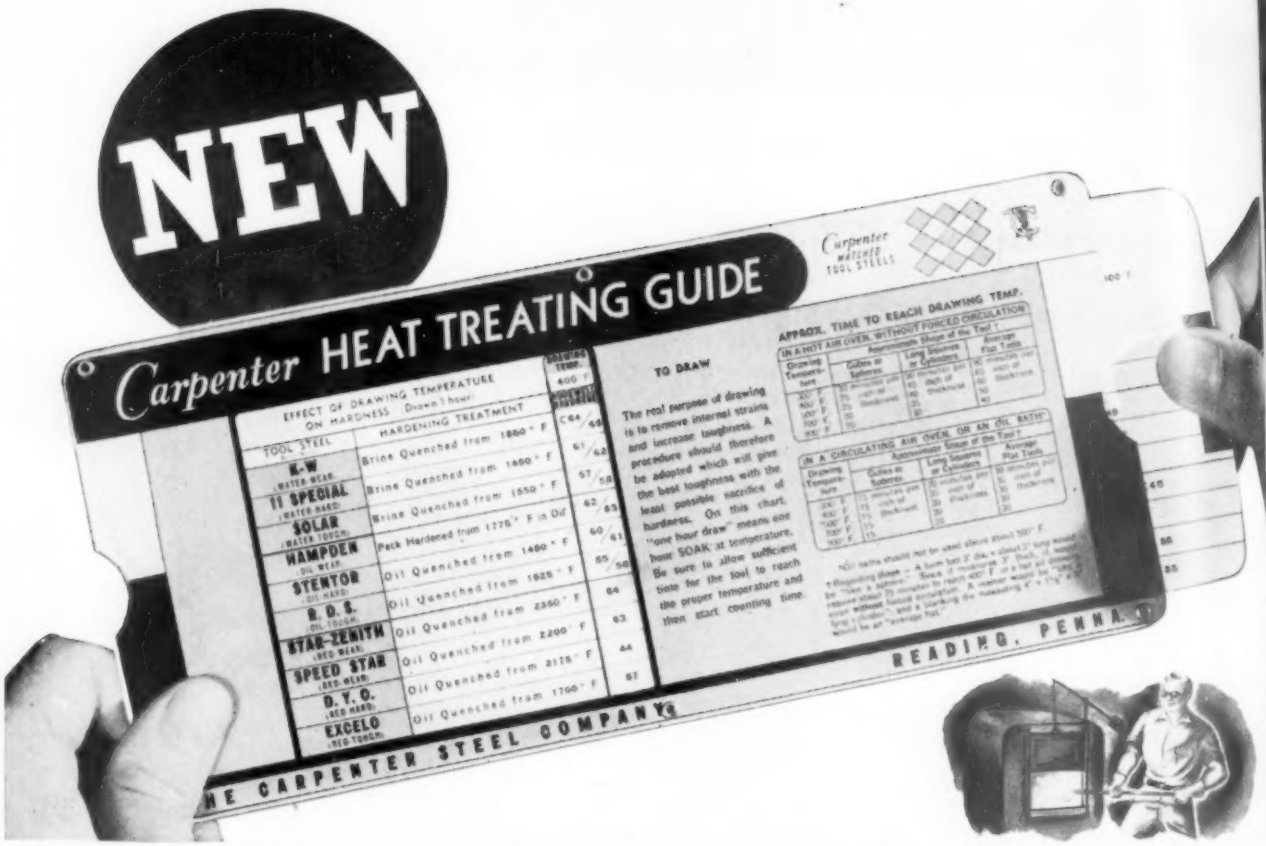
To obtain maximum life and consistent accuracy in resharpening your hobs, follow this 6-Point Sharpening Program:



1. Be sure that the hob is truly and accurately mounted on the arbor in the machine. (Fig. 1)
2. Grind the faces of the hob teeth radial, or with correct rake as marked on the hob. (Fig. 2)
3. Accurate gashes, either straight or helical, must be maintained to insure correct form. (Fig. 3)
4. Hob teeth must be precisely indexed in sharpening, or uneven cutting action and wasted hob life will result. (Fig. 4)
5. Keep grinding wheel clean and free cutting.
6. Keep all hobs sharp, at no time allowing wear to exceed .005" to .010", depending on the type of hob.

SHELL CUTTING OILS for metal cutting and grinding

SHELL


NEW
Carpenter HEAT TREATING GUIDE
Carpenter matched TOOL STEELS
EFFECT OF DRAWING TEMPERATURE ON HARDNESS Drawn 1 hour
TOOL STEEL
HARDENING TREATMENT
TO DRAW
APPROX. TIME TO REACH DRAWING TEMP.
IN A HOT AIR OVEN, WITHOUT FORCED CIRCULATION
IN A CIRCULATING AIR OVEN, OR AN OIL BATH*
READING, PENNA.
THE CARPENTER STEEL COMPANY

To Select Heat Treating Data Quickly, Accurately

Men responsible for tools will find this new Heat Treating Guide issued by The Carpenter Steel Company a great convenience and time saver for themselves and the heat treating department. This is because it gives complete information on the heat treatment of all Carpenter Matched Tool Steels in handy, easy-to-use form.

You can tell at a glance for each steel: the type analysis, forging heat, normalizing heat, annealing treatment, hardening treatment, furnace atmosphere and recommended drawing range. In addition you can determine for each Matched Tool Steel the hardness for various drawing temperatures.

Just fill in the coupon and mail it to us, or write us on your company letterhead for your Heat Treating Guide. (Free to Tool Steel users in the U. S. A.)

Send this Coupon for Free Heat Treating Guide

THE CARPENTER STEEL COMPANY
122 W. Bern St., Reading, Penna.

Please send me free, and without obligation, the new Carpenter Tool Steel Heat Treating Guide.

NAME..... TITLE.....

COMPANY.....

STREET.....

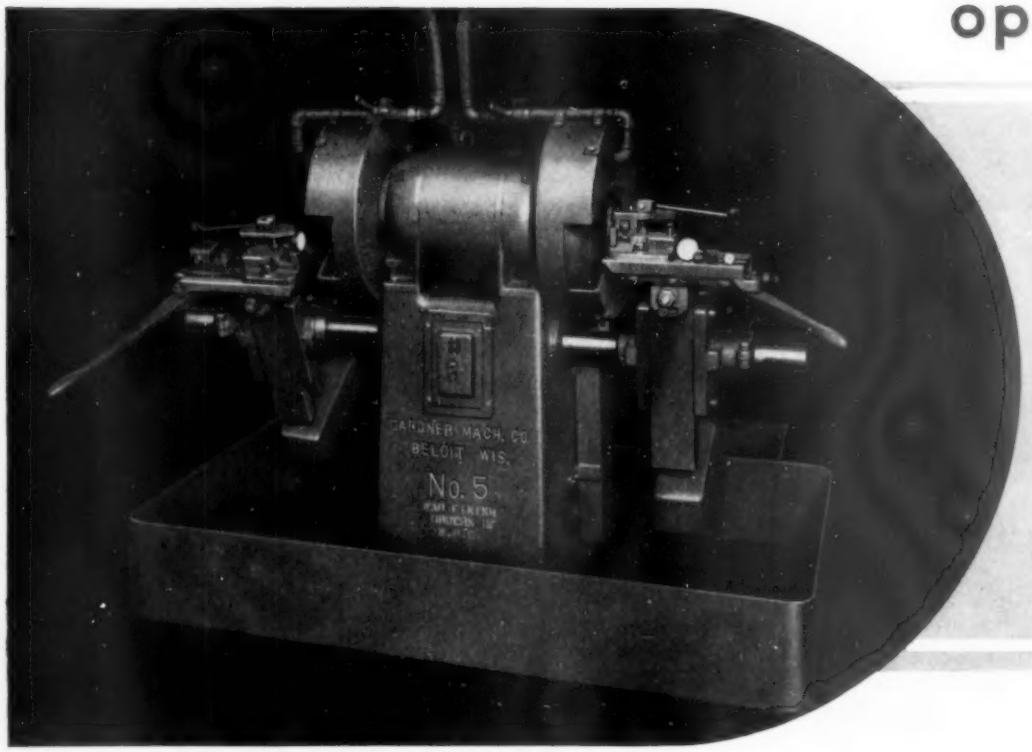
CITY..... ZONE..... STATE.....

(PLEASE PRINT)

Carpenter MATCHED TOOL STEELS

NILCOR STEEL • Canton, Ohio
PITTSBURGH PLATE GLASS CO., Kokomo, Ind.
GUMBY PUMP CO., Chicago, Ill. • ILLINOIS STEEL CO., South Chicago, Ill. • SUNNYVALE NAVAL AIR STATION, Sunnyvale, Calif. • STREINE TOOL & MFG. CO., New Bremen, Ohio • WESTINGHOUSE ELECTRIC & MFG. CO., Philadelphia, Penna. • CURTISS PROPELLER DIV., Caldwell, N. J. • WRIGHT AERONAUTICAL CORP., Paterson, N. J. • CURTISS-WRIGHT CORP., Buffalo, N. Y. • ATLAS METAL STAMPING CO., Brooklyn, N. Y. • ALUMINUM CO. OF AMERICA, Pittsburgh, Penna. • WESTINGHOUSE ELEC. & MFG. CO., East Pittsburgh, Penna. • ALUMINUM CO. OF AMERICA, Lafayette, Ind. • GENERAL FIRE EXTINGUISHER CO., Providence, R. I. • KUNKLE VALVE CO., Trumbull, Conn. • BUFF & BUFF MFG. CO., Buffalo, N. Y. • DOMINION ENGINEERING WORKS, Montreal, Que., Canada • ALUMINUM CO. OF CANADA, Montreal, Que., Canada • DOUGLAS AIRCRAFT CO., Santa Monica, Calif. • BURBANK NAVAL AIR STATION, Burbank, Calif. • OFFICER IN CHARGE, Fall River, Mass. • WRIGHT AERONAUTICAL CORP., Wood-Ridge, N. J. • CURTISS WRIGHT CORP., Buffalo, N. Y. • UNION PACIFIC R. R. CO., Omaha, Nebr. • WESTINGHOUSE ELECTRIC & MFG. CO., East Pittsburgh, Penna. • ALUMINUM CO. OF AMERICA, Pittsburgh, Penna. • ATLAS METAL STAMPING CO., Brooklyn, N. Y.

A handy, *efficient* machine *for* light flat surfacing operations



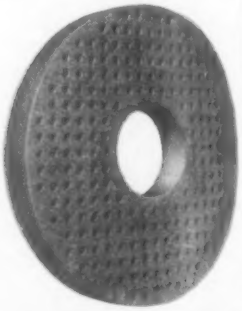
"Gardner-Grind YOUR flat surfaces"

DO YOU finish small flat surface parts? Like the steel specimens seen above, which are cut from bar stock, and must be ground on one face to produce a fine finish for etching in a steel analysis?

This late-model No. 5-18" Gardner Disc Grinder, with its sturdy little 3 H.P., 1200 R.P.M., built-in motor, is a productive, cost-reducing unit on a host of light jobs. Use it in your tool-room — on the production line — WHEREVER light manufacturing is encountered!

Built as above, with two lever-feed tables and wet grinding system — or with several other equipment combinations. Ideal for either wet, or dry, grinding!

GARDNER WIRE-LOKT DISCS mean *more efficient* DISC GRINDERS



This tool can do much on your small flat surface jobs — WRITE FOR BULLETIN 202

GARDNER MACHINE COMPANY

442 East Gardner Street , , , , Beloit, Wisconsin, U.S.A.

It pays to have your worn cutters reground by Severance

Worn, dulled cutters reground by Severance are exactly the same as new. Severance regrinders are not just "regrinding experts," they are the same new tool craftsmen, using the same precise skill and care as they do in grinding new tools from the solid.

After regrinding, each cutter is further improved by the exclusive "Severite" heat-treat process that increases tooth hardness and thus lengthens cutting life from three to five times. This "Severite" heat treatment costs you nothing—it is simply another of the many ways in which Severance gives you more for your regrinding dollar.

Severance service, too, is an advantage to you. There are six complete Severance plants located strategically throughout the United States. Check up on the worn cutters, rotary files, burrs, etc. in your plant now. For best service, send them to the Severance plant nearest you for a factory regrinding job.

Severance

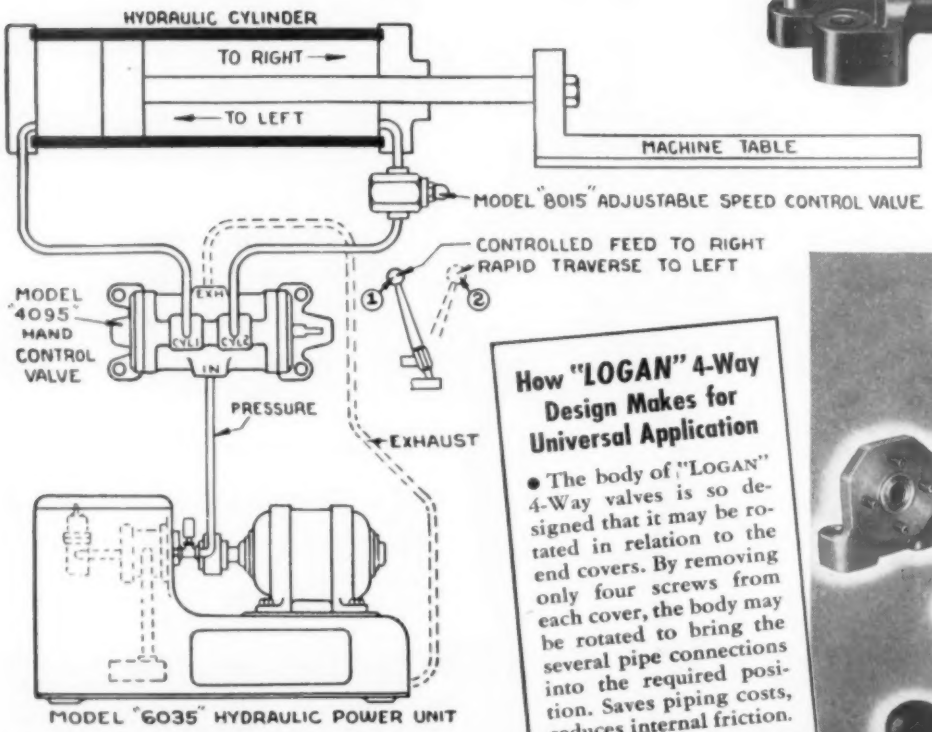
Midget Milling Cutters • Precision Regrinding

SEVERANCE TOOL INDUSTRIES INC., SAGINAW, MICH. • PLANTS IN LONG ISLAND CITY 1, N. Y.; DETROIT 2, MICH.; FORT WAYNE, 8, IND.; CHICAGO 6, AND LOS ANGELES 21. • IN CANADA: 60 FRONT ST., W., TORONTO, ONT.

"LOGAN" CONTROL Hydraulic VALVES

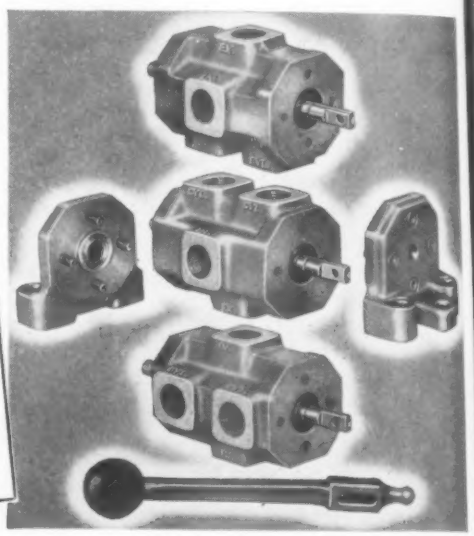
Hand, Foot, Solenoid, Cam, Pilot, and Latch-Operated 4-Way Types. Relief, By Pass, Pressure-Regulating – Feed and Pilot Operating.

● Model 4095—hand operated valve —for oil service only. Maximum pressure, 1500 lbs. P. S. I.



How "LOGAN" 4-Way Design Makes for Universal Application

● The body of "LOGAN" 4-Way valves is so designed that it may be rotated in relation to the end covers. By removing only four screws from each cover, the body may be rotated to bring the several pipe connections into the required position. Saves piping costs, reduces internal friction.



THE application chart above illustrates one of the simpler hydraulic circuits obtained through the use of "LOGAN" standard hydraulic equipment. In this circuit Model 4095 hand valve and Model 8015 adjustable speed control valve are used to produce a feed stroke to the right and a rapid traverse to the left. When the handle is at the No. 1 position, oil flows through control valve to left end of cylinder, moving machine table to right. Oil from right end is metered through the Model 8015 speed control valve, controlling the feed. No. 2 position reverses the flow. Pressure is furnished by the standard "LOGAN" Model 6035 power unit.

For all Types of Hydraulic Circuits

● "LOGAN" 4-way piston type hydraulic valves meet practically all requirements for hand or semi-automatic control. The rotating principle of design described above eliminates the use of special valves, minimizes internal friction and reduces labor costs for piping the hydraulic circuit by eliminating elbows and street ells. This exclusive feature makes these "LOGAN" valves applicable to practically all types of hydraulic circuits. "LOGAN" valve bodies are made of high grade chrome-nickel cast iron, with hardened alloy steel pistons. These sturdy, precision-built valves insure accurate, dependable control and long, trouble-free service. A complete range of sizes from ¼" to 2" is available, for maximum pressure of 1500 lbs. P. S. I. Write for Catalog 80, Section 3.

LOGANSPORT MACHINE CO., INC.
902 Payson Road, Logansport, Indiana

"LOGAN" Air and Hydraulic Equipment

CHUCKS ★ CYLINDERS ★ VALVES ★ PRESSES ★ SURE FLOW COOLANT PUMPS

"Sterling" Stainless Steels

FOR DISCRIMINATING USERS

A complete line of wire, rod and bars

FIRTH-STERLING—a mill with a national reputation for consistently high quality Tool and Alloy Steels—is in a unique position to meet the special requirements of discriminating users of Stainless Steels. Since 1913, when FIRTH-STERLING made the first Stainless Steel produced in this country, we have specialized on made-to-order types for the most exacting specifications. Literature is available, giving complete details.

"Sterling" Stainless Steels Meet Special Requirements such as:

1. Closely Controlled Compositions.
2. Exacting Physical Requirements.
3. Surface Perfection in Various Finishes.
4. Precise Size and Shape Tolerances.

Ask For:

Bulletin No. SL-2009 on Types 420, 440-A, 440-B, and 440-C.

Bulletin No. SL-2010 on Types 403, 410, and 416.

Bulletin No. SL-2011 on Types 302, 303, and 304.

Bulletin No. SL-2018 on Cold Finished Stainless Steels.

Makers of Fine Stainless Steels Since 1913

Firth-Sterling
STEEL COMPANY

Offices: McKeesport, Pa. New York - Hartford - Philadelphia - Cleveland - Dayton - Detroit - Chicago - Los Angeles

HOW TO SOLVE

Cutting Oil Problems

Accurate Finish Reduces Operations

HOBBING REDUCTION GEARS, like those used on Navy destroyers, calls for extremely accurate finish to reduce subsequent operations to a minimum.

This requires a cutting oil with high penetrating and cooling ability to remove frictional heat. Maximum anti-weld and pressure-resistance keep the built-up edge mobile and sloughing with the chip.

In vital war production, S/V Sultran Cutting Oils have proved that they possess these exceptional qualities. For example, a manufacturer, hobbing gears for destroyers, found it necessary to shave and lap the teeth to get the required finish. At our suggestion, he started using S/V Sultran Oils.

As a result the finish was so perfect that he was able to eliminate the shaving and lapping operations. Not only that, but speeds and feeds were increased, and there was a marked reduction in damage to hobs.

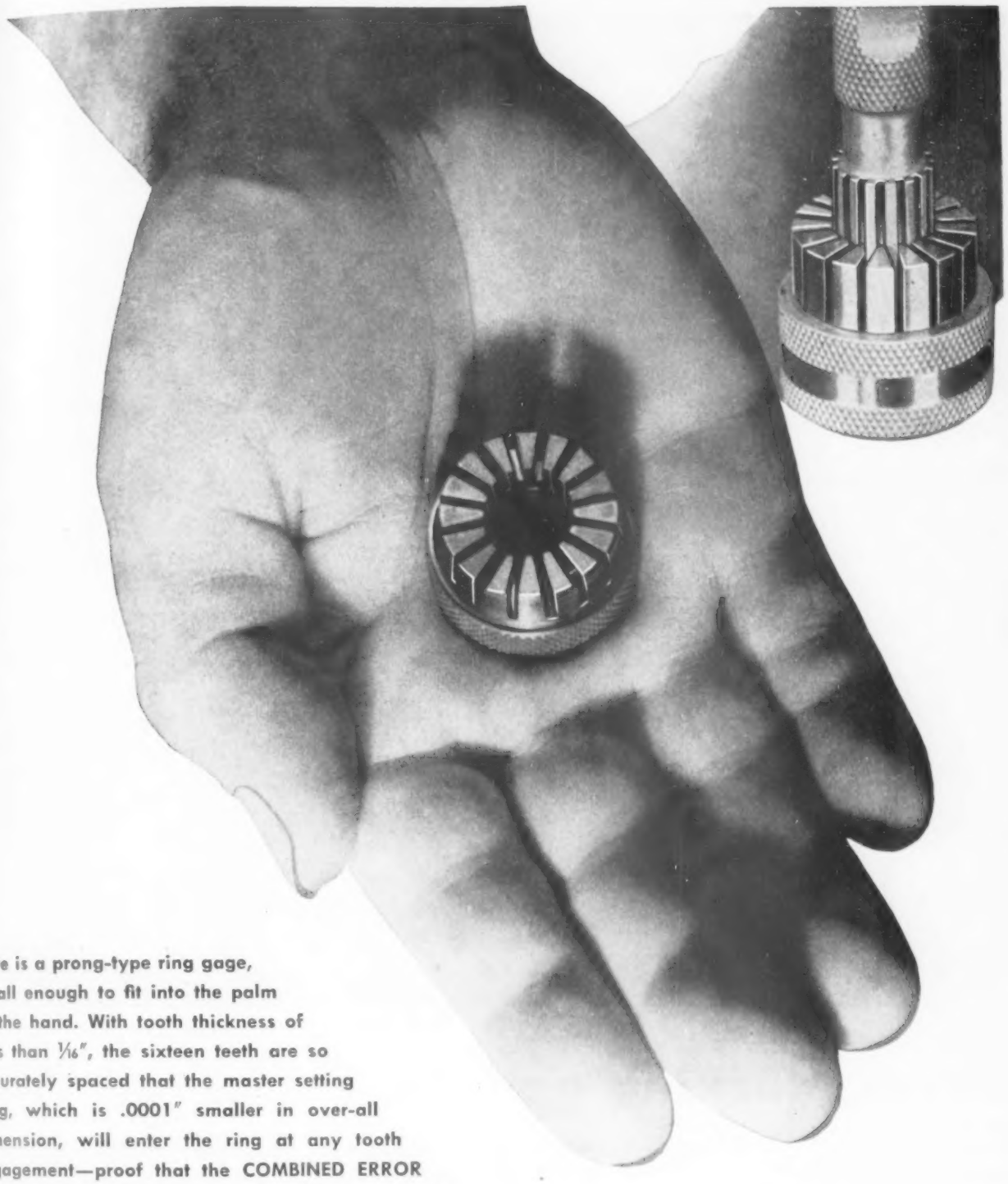
Use a Cutting Oil here with high antiweld, pressure resistance and cooling ability.

GARGOYLE Lubricants

SOCONY-VACUUM

OIL COMPANY, INCORPORATED

Standard Oil of N. Y. Div. • White Star Div. • Lubrite Div. • Chicago Div. • White Eagle Div.
Wadhams Div. • Magnolia Petroleum Co. • General Petroleum Corporation of California



Here is a prong-type ring gage, small enough to fit into the palm of the hand. With tooth thickness of less than 1/16", the sixteen teeth are so accurately spaced that the master setting plug, which is .0001" smaller in over-all dimension, will enter the ring at any tooth engagement—proof that the COMBINED ERROR in spacing, parallelism and centrality of teeth IN BOTH PARTS cannot exceed .0002". A good gage is mechanically exact. Vinco makes good gages.

VINCO CORPORATION, 8857 SCHAEFER HIGHWAY, DETROIT 27, MICH.

SALES OFFICES— NEW YORK CLEVELAND CHICAGO

MILLIONTHS OF AN INCH FOR SALE BY VINCO

Semi-Automatic Hydraulic Spline and Gear Grinder • Optical Master Inspection Dividing Head • Involute Checker • Angle Tangent to Radius Dresser • Index Plates • Precision Vises • Sine Bars • Straight-side Spline, Serration Spline, Involute Spline and Helical Spline Plug and Ring Gages • Thread Plugs, Rings and Setting Plug Gages • Spur and Helical Master Gears • Munition Gages • Propeller Hub Gages • Built-up and Special Gages • Gear Rolling Fixtures • Spline and Index Fixtures • Hydraulic Power, Control, Utilization and Distribution Units • Engineering, Design and Development.

16-ton Hannifin hydraulic press at plant of Wright Aeronautical Corporation

Keeps marking uniform

This operation of marking numbers on aircraft engine connecting rods makes full use of the advantages of Hannifin hydraulic press design. The smooth application of pressure, and automatic reversal of the ram at a predetermined uniform maximum pressure, insures uniform marking of successive pieces, compensating for small variations. The operator can produce accurate work rapidly and easily.

Maximum ram pressure is adjustable, making this press easily adaptable to a variety of work. Ram stroke is also adjustable, to avoid unnecessary up-travel in production operations.

Hannifin hydraulic presses are built in a wide range of standard types, 5 tons to 150 tons, for straightening, forming, press-assembly, and similar work. They are being used in modern manufacturing operations by producers of aircraft, engines, machine tools, military vehicles and armament. Write for press bulletins or consult Hannifin engineers for specific recommendations.

HANNIFIN MANUFACTURING COMPANY
621-631 South Kolmar Avenue • Chicago 24, Illinois

HANNIFIN · CHICAGO · USA

Hannifin

HYDRAULIC PRESSES

PRODUCTION PERSPECTIVES

T.M. REG. BY THE BRAMSON PUBLISHING COMPANY

WAR PRODUCTION: Unofficial surveys of mass production industry indicate the beginning of an over-all downward trend in war materiel output....Scattered reports reveal numerous cut-backs and completions of war contracts....WPB has slowed up the release of official monthly production figures, lending credence to the belief that output is "so-so" in relation to schedules.

THE OUTLOOK: Nonetheless, battle-front developments are setting the pace for factory output....Official Government figures place May munitions production 1 per cent above the April level, 1 per cent below schedule....So astronomical is current output that small percentages mean little. Example: Revised figures show April production was 16 times that of the last 6 months of 1940.

TODAY'S JOB: Though many war production programs are easing off in anticipation of German collapse, momentary Army requirements have skyrocketed the need for shells, tanks and heavy trucks. All have been shifted from the "cut-back" category to "top priority".

SHIPBUILDING: With workers leaving to seek employment elsewhere, Maritime Commision Chairman Land charges that reports of declining shipbuilding are "sabotaging the program at the most crucial point"....Last month he gave the program a "hypo", placed orders for another 262 big ships. Output remains at a rate of 1,600-plus ships monthly, with officials charging that reasonable worker effort would boost shipyard output 20 per cent.

CHANGES: Don't count yourself out of war production until the fighting is over. One high Ordnance official says many plants will soon be handed new contracts necessitating retooling and, in some cases, complete conversion for new items....Changing requirements may change your job over night. For example, 80,000 heavy trucks badly needed by European invasion forces now have equal priority with the new B-29 Superfortress.

CONVERSION: Though war production remains the Number 1 job, all industry is eyeing carefully each development in WPB Chairman Nelson's plans for gradual reconversion....Most important step expected for some time will be the August 15 order permitting WPB field offices to grant "spot" authorizations for manufacture of civilian goods (see page 109).

DETAILS: Armed Forces-WPB controversy over the extent of reconversion has simmered down to a 35 per cent cut-back if the Army has its way, 50 per cent if the WPB prevails when Germany falls....So great has our economy expanded that the smaller cut-back would provide almost as much manpower, materials and facilities for civilian production as the U.S. possessed before the war. The automobile industry's bid for early resumption of civilian output is based on this fact (see page 132).

MANPOWER: With cut-backs more than matching recently expanded war production programs, labor is not expected to become more critical. Three exceptions: Steel mills, foundries and machine tool builders are pinched for manpower.... Total employment is falling. War industries currently are losing 100,000 workers a month. Reversal of trend is not foreseen.

MACHINE TOOLS: Through no fault of its own, the machine tool industry is again a bottleneck. This time the demand comes from a few top-priority war jobs....Loss of skilled manpower and shops crowded with other war jobs have put builders behind the eight ball....Orders rose 6.3 per cent in May, the backlog 11.4 per cent. Unable to boost production substantially, new unrated orders for postwar use may go untouched until late fall (see page 112).

INTERLOCKING *Performance*

Working together as closely as the navigator and pilot of a bomber, "Greenfield" Taps *and* Gages are a production team, cutting and checking billions of screw threads that hold together the interchangeable metal parts of modern armament. It is a team that must work with the greatest precision — and speed.

"Greenfield" is a leading manufacturer of both production taps and precision gages. As a team, these tools have met the challenge of an unprecedented wartime demand. A team mobilized and perfected for war production, "Greenfield" Taps *and* Gages will continue to help American industry win its peace-time battle of production as well.

FOR INTERLOCKING PERFORMANCE, SPECIFY "GREENFIELD" TAPS AND GAGES

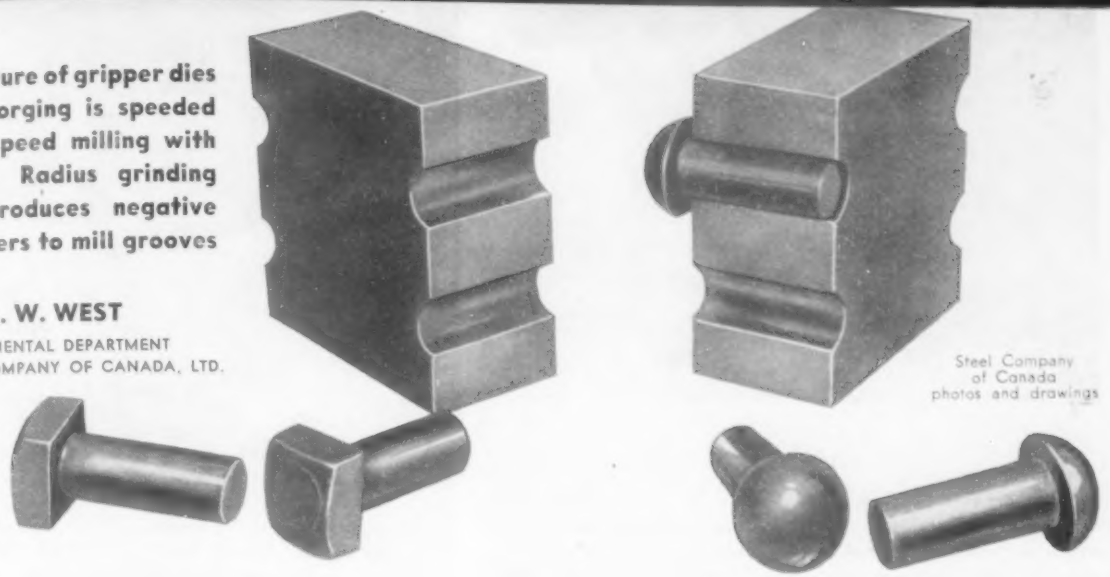
ARMY E NAVY

GREENFIELD TAP & DIE CORPORATION
GREENFIELD, MASSACHUSETTS, U. S. A.

GTD GREENFIELD

Manufacture of gripper dies for hot forging is speeded by high speed milling with carbides. Radius grinding fixture produces negative rake cutters to mill grooves

A. W. WEST
EXPERIMENTAL DEPARTMENT
THE STEEL COMPANY OF CANADA, LTD.



Steel Company of Canada photos and drawings

FIGURE 1. Gripper dies used in manufacturing rivets and bolts.

Machining Tool Steels at High Speeds

A NEW high speed method of manufacturing tools from die steel annealed to 15 Rockwell C, has been developed at the Toronto Plant of The Steel Company of Canada, Limited. In manufacturing these tools, which are gripper dies for forging machines, man hours have been reduced by more than 80 per cent. All the operations are performed on a milling machine and a power saw. An operator can be trained in about three to four weeks to grind the cutting tools, set up the machine and complete the manufacture of the dies.

Conventional manufacture of such tools as dies for continuous hot headers, has always been time consuming. The dies are made of a special hot die steel annealed to Rockwell C 15, and a typical analysis is: 5.00 Chrome, 1.30 Tungsten, 1.45 Moly, 1.00 Silicon. A finished set, ready for heat treatment is shown in Figure 1, along with the rivets and machine bolts produced by these types of dies.

The manufacture of machine bolts and rivets by the continuous process requires:

1. A continuous forging machine with feed rolls, cut-off and gripper dies and header tool, all of which operate automatically, producing rivets and flash and trim machine bolts up to 1" diameter by 6" long at a rate of from 60 to 125 pieces per minute.

2. Furnace with capacity to heat 10 to 15 bars 28 ft. long at 2000°F.

The dies and header are the heart of the machine, and the quality of the rivets or machine bolts depends entirely upon the quality of the dies and header.

The Steel Company of Canada, Limited, has three of these machines, operating day and night, producing rivets and bolts principally for ship building.

COMPARISON OF METHODS

The "bottleneck" in output of rivets and machine bolts existed in the tool room when dies were produced by conventional methods. The output of the "Continuous Department" expanded three-fold, and consequently more tools were required.

For example, standard procedure for manufacture of dies for a ⅞" machine bolt was:

1. Cut rough bar 5" square to double the length of rivet and shape to outside dimensions. Groove in a milling machine, using the nearest standard milling cutter to size required. Saw the piece in half and square the ends in a shaper.

2. Dies are then clamped together, drilled and reamed to exact size, and heat treated.

The new method centers around modern milling machines equipped with tungsten carbide cutters and power saw.

1. All flat surfaces are machined with an end mill with two cutters, operating at approximately 930 rpm, giving a surface cutting speed of 1300 feet per minute. Cutting dry gives an exceptionally fine finish and an accuracy of plus or minus .001" in die dimensions and within .0005" in six inches in checking for squareness.

For roughing, table feed is from 5" to 8" per minute, and depth of cut from 1/16" to 3/16" (depth of cut has little effect on tool life, but requires greater power). Approximately .010" is left for a finishing cut. Speeds and feeds for finishing cuts are 1300 lineal feet per minute and table speed of 10" to 15" per minute.

2. For all formed surfaces, the miller, operates at 1250 rpm., with special formed tungsten carbide tool assemblies forming the grooves to exact dimensions and producing a finish requiring no further machining or bench work. (Figure 2).

CONSTRUCTION OF DIES

Tool steel bars 5" by 5", cut in 32" lengths, are used to make up five sets of ⅞" by 3" machine bolt or rivet dies. Table 1 compares the man-hour requirement of the new method with the old.

Using a compact tool holder in which four semi-circular carbide tipped bits are inserted two parallel grooves are milled simultaneously in the tool steel bars from which dies will be produced. The tools run at 950 surface feet per minute on a 3" diameter. Average tool life has been shown to be 50 sets of dies.

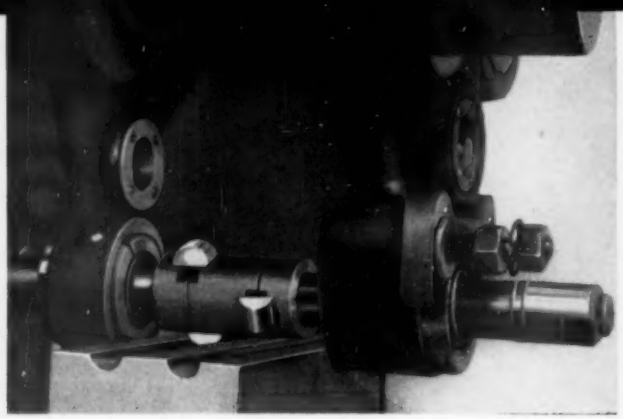


FIGURE 2.

Parallel grooves are milled simultaneously in tool steel bars. Cutter assemblies consist of carbide tips brazed to steel inserts which are mounted in holder. For rough and finish cuts, the cutters run at 1250 rpm (950 sfpm), with feeds of 9" and 36".

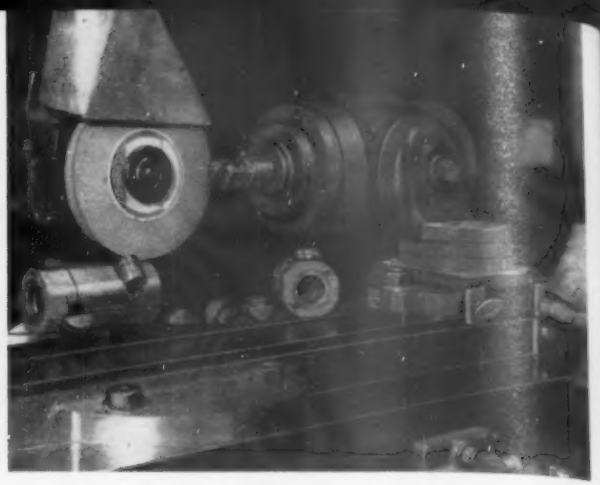


FIGURE 3.

Carbide-tipped inserts for roughing are ground to semi-circle in fixture shown above. Finishing cutters are ground with special holder illustrated in Figure 5.

Grooving is performed in two cuts. During the first cut, the feed rate is up to 9" per minute, the cutter assembly running at 1250 rpm., and cutting to within .005" of the finished dimensions. The work table is raised .005" for the finish cut running with a table speed up to 36" per minute. A smooth surface is obtained, requiring no further finishing or grinding. All operations are done climb milling.

The cutters consist of carbide tips, ¼" thick, brazed on a steel insert less than 1" long. Four of these bits are dovetailed into the holder to make a cutter approximately 3" in diameter. Bits are locked in place by a nut at end of arbor.

The tool holder is bored to suit the standard milling machine arbor, and is dovetailed out to take the carbide-tipped insert. The body is dowelled (see Figure 4) and is split through each section to permit clamping and locking the inserts in their correct position.

Tool bits are set at 90° in the holder, as shown in Figure 4. The carbide tips have a negative rake of 15° to 20° at the extreme end.

MANUFACTURE OF INSERTS

Inserts can be manufactured economically in lots of twelve or fourteen. Satisfactory results have been obtained by using 10" lengths of steel turned to 1" diameter. Satisfactory results are obtained with a hot die steel, Rockwell C. 40 to 43 after being drawn at 1100°F. The dovetail is then produced (using two 3/16" diameter rods for measuring to maintain interchangeability of inserts). The 10" bar is cut into sections which are finished to ⅝" lengths. The pieces are hardened, drawn and shot blasted.

Normal precautions should be observed when welding the tip to the insert. The carbide and insert must be thoroughly cleaned, a non-oxidizing flame used, and work should not be overheated. The brazing is done using the standard sandwich braze with constantan sheet in the center. Care must be taken not to blow the flux out of the joint, particularly during the heating operation. The tool is then slow cooled in mica to prevent carbide cracking.

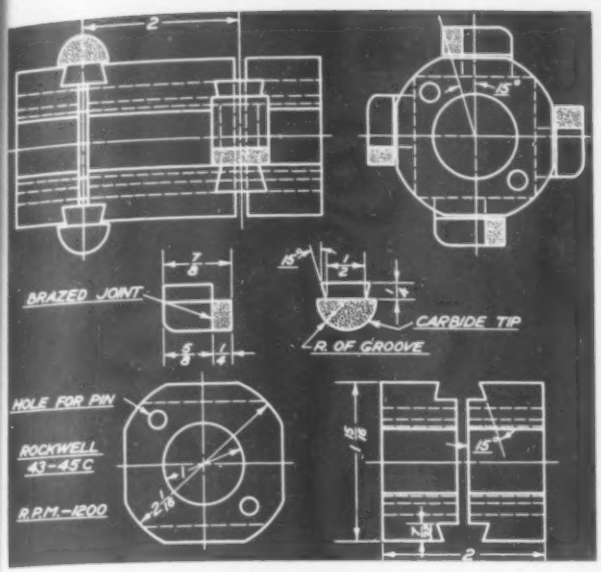
Final grinding of the carbide insert to exact size is done on a modern cutter grinder, using a diamond wheel (220B100) ¼" wide and grinding with the outside periphery of the wheel (Figure 3). The carbide insert is held in the jig and turned slowly to allow the heat to dissipate after each cut. These cutters can be ground accurately to the size of groove required. Tools for roughing the groove are standard half round and are ground to within 1/16" of the final diameter. Finishing tools are ground elliptically as shown in Figure 5. The

TABLE 1.

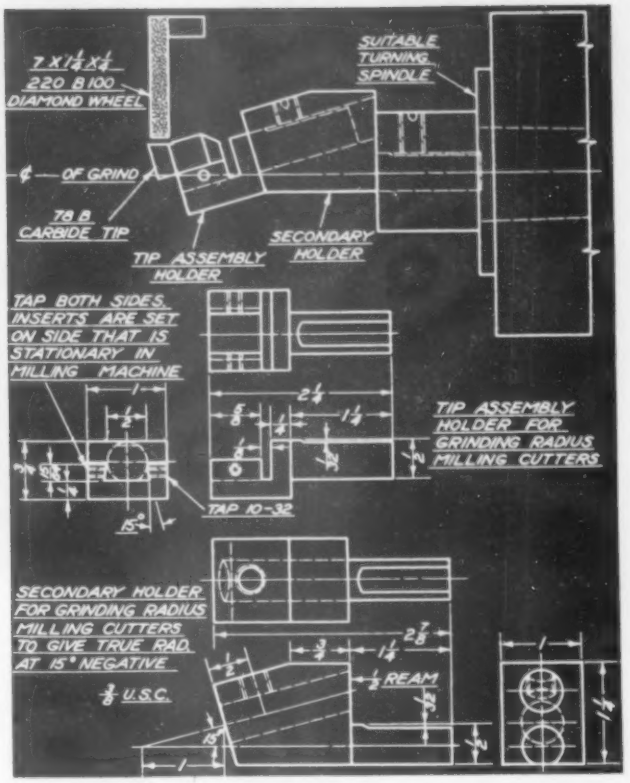
COMPARISON OF MAN HOURS REQUIRED TO MANUFACTURE 7/8" BY 3" MACHINE BOLT AND RIVET DIES BY NEW METHOD AND OLD METHOD.

NEW METHOD		OLD METHOD	
1. Surface milling using new high speed machine on 4 sides of the bar (2 cuts per side)	2½ hrs.	1. Shaping 4 sides (2 cuts per side)	10 hrs.
2. Groove milling using same machine, and cutting the grooves complete	¾ hrs.	2. Groove milling using high speed cutters and standard slow feeds and speeds	4 hrs.
3. Saw to 3-1/16" lengths in power saw. Milling operator can perform this task, producing 9 cuts, in 2¼ hrs.		3. Saw to 3-1/16" lengths in power saw (Same as new method)	
4. Squaring ends of dies, and making dies to correct length in V-block on milling machine, using end facing mill	2½ hrs.	4. Squaring ends of dies on shaper, and making dies to correct length	12½ hrs.
		5. Clamping dies together and drilling and reaming the grooves (one drill and two reamers)	15 hrs.
Five sets complete	5¾ hrs.		41½ hrs.
Man hours required per set of dies	1.15 hrs.		8.30 hrs.

The new method is 7.2 times faster than the old method, and dies are more accurate and uniform.



Above: FIGURE 4.
Tool assembly for carbide cutter, showing roughing cutters. (Same holders are used for finishing cutters.)


7 X 1¼ X ¼
220 B 100
DIAMOND WHEEL
SUITABLE TURNING SPINDLE
℄ OF GRIND
78 B CARBIDE TIP
TIP ASSEMBLY HOLDER
SECONDARY HOLDER
TAP BOTH SIDES. INSERTS ARE SET ON SIDE THAT IS STATIONARY IN MILLING MACHINE
TIP ASSEMBLY HOLDER FOR GRINDING RADIUS MILLING CUTTERS
TAP 10-32
SECONDARY HOLDER FOR GRINDING RADIUS MILLING CUTTERS TO GIVE TRUE RAD. AT 15° NEGATIVE
⅜ U.S.C.
½ REAM

Right: FIGURE 5.
Special holder permits grinding carbide-tipped inserts to elliptical form, which, combined with negative rake, produces a true semi-circular groove in die.

above applies to grooves with finished diameter 7/8″ and over. A groove under 7/8″ is produced entirely with elliptical tools in two cuts, i. e., the finished size elliptical tools are used to rough out the groove within .005″ of the finished size and the final cut takes out the final .005″ to finished size. (Sequence of operations is shown in Figure 6).

Until the grinding fixture was designed for producing the true radius in conjunction with a 15° negative rake, the groove was machined in the die with a standard half-round tool and this tended to give an elliptical section in the groove. Though the deviation from a true semi-circle in the groove was slight, the bolts and rivets checked for diameter would vary a few thousandths and this was overcome by making the tools slightly elliptical by the use of a fixture which has made it economical to produce a correctly ground elliptical carbide tool.

Sides of the tool steel stock for dies are squared and machined by fly-cutters running dry at a cutting speed of 1300 lineal feet per minute (Figures 7, 8 and 9). Bits are produced from standard carbide lathe turning tools, with a negative rake ground on top of 2° to 10°. The table is set off to allow for clearance of the cutters on the return side. Theoretically, this leaves a slightly concave surface across the bar, but a practically dead flat surface results.

Best results seem to be obtained from an end-mill ½″ larger in diameter than the stock to be machined. For example, 5″ square bars require an end mill 5½″ in diameter. There is a ¾″ steel ring around the body, and three ⅝″ set screws hold the cutters in place.

To reduce the shock and angle of strike at the cutters, the relation of the work to the cutters in the end mill is shown in Figure 10.

End mills for facing flat stock have been run from ½ to 2-½ hours. Scale on the bars requires more frequent grinding of the tools. Experiments have indicated that it pays to remove the scale with inhibited acid pickle. Grinding and setting of tools in the head is such an easy matter however, that this factor has not raised any serious problems.

Many types of tool steel have been successfully machined by this method, including .40 Carbon, 1.00 Carbon, hot die steel, 18-4-1 high speed steel and high-carbon, high-chrome tool steel.

The re-dressing of all hot forged dies is also done by this method. Dies are first annealed by using sub-critical anneal which gives steel in the proper condition for high speed milling with practically no scale.

Outstanding features of this technique of making dies are speed, finish and accuracy. Simplicity of operation permits replacement of a skilled toolmaker with a regular milling machine operator. Further, the carbide tool setup is efficient and self-contained. Costs are reasonable

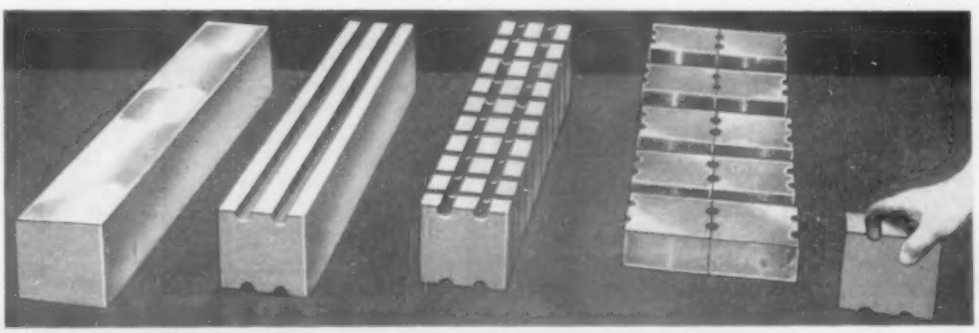
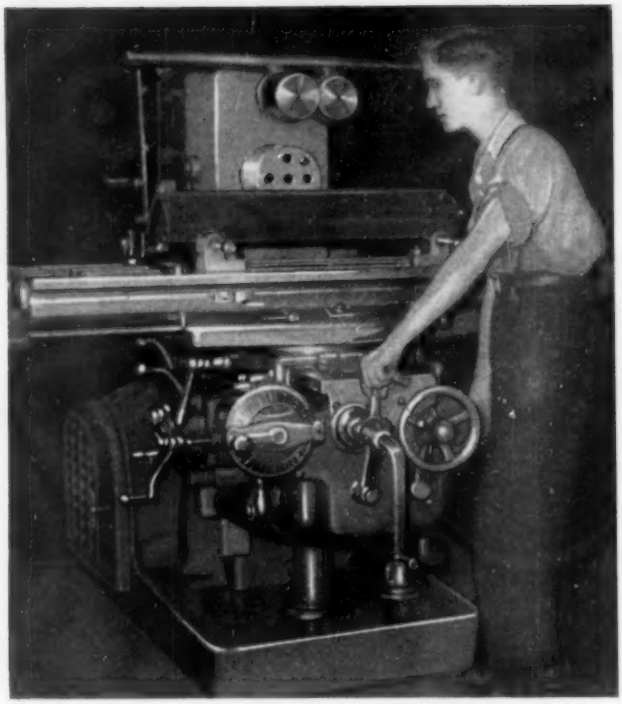


FIGURE 6.
Sequence of operations for milling gripper dies from tool steel consists of squaring sides with fly-cutter, grooving parallel channels, and sawing to length.



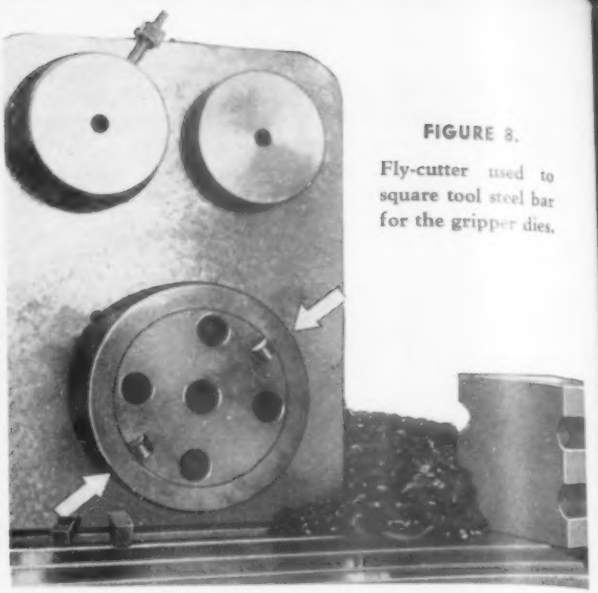


FIGURE 8.

Fly-cutter used to square tool steel bar for the gripper dies.

***Left:* FIGURE 7.**

Fly-cutter, consisting of standard lathe tools mounted in holder, is used to square sides of tool steel bar. Cutter rotates at 930 rpm (1300 sfpm) and table feed is 5″ to 8″ for roughing, 10″ for finishing. Depth of cut is 1/16″ to 3/16″.

considering the amount of metal removed during the life of a tool.

In bolt manufacture alone, the method has been extended to production of open dies for cold headers, roll thread dies, for both hot and cold work, and for all plane surfaces usually machined in the milling machine, planer or shaper. We point out, however, that in connection with the manufacture of roll thread dies, we refer to only the flat surfaces and have not attempted to mill the thread by this method.

Formed work can be produced accurately and economically. Cutting times exceed conventional methods by 15 to 20 times. Handling of steel to and from the machine can be cut appreciably by installation of air chucks and hydraulic holders. The chips are heavy, and 10 hours running produces a large wheelbarrow of chips. The tools cutting dry maintain cleanliness around machine and operator.

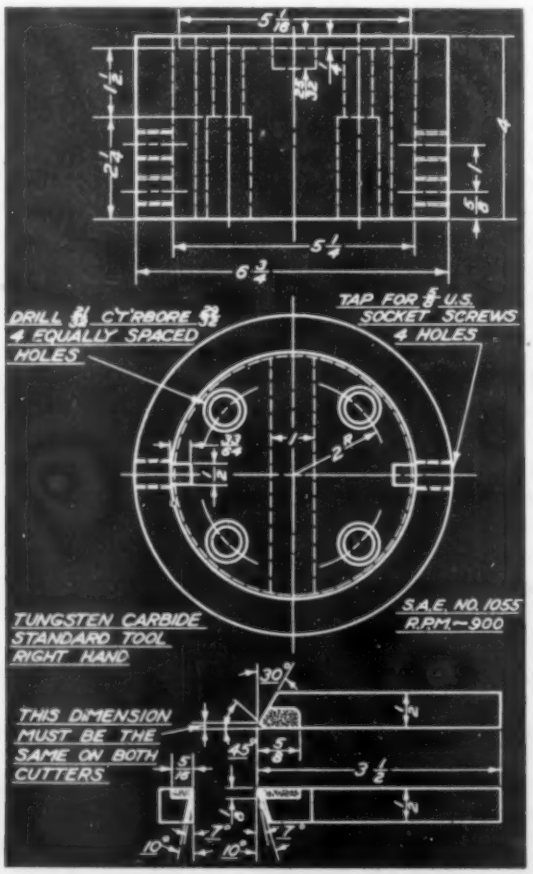
Simplicity in the design of tools allows the operator to sharpen the carbide easily. Sharpening formed carbides does not change diameter in any way, because the angle of the face of the tips is maintained in the same relation to the cutter body.

A 50-lb. flywheel 12″ in diameter has been fastened permanently to the spindle nose and this has proved beneficial in reducing vibration and the flywheel action gives positive energy to the tools as they enter the cut. This has increased carbide tool life about 50%.

A standard 8″ by 24″ magnetic chuck, direct current operated, has been mounted on edge and is used successfully to hold material from 1/8″ to 1″ thick up to 8″ wide by 24″ long. Stops are used on the ends to prevent work sliding off the chuck, but no other clamps are necessary.

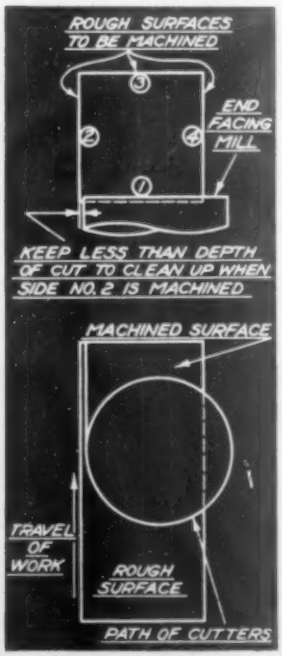
Recently high speed milling has been successfully applied to a standard production miller (not universal type) and the clearance for the return of the cutting tools past the work was accomplished by offsetting the spindle slide with .010″ shin on the front way.

THE END



***Left:* FIGURE 9.**
Fly-cutter head.

***Below:* FIGURE 10.**
Diagram shows relation of fly-cutter to work to reduce shock and impact of carbide.


ROUGH SURFACES TO BE MACHINED
END FACING MILL
KEEP LESS THAN DEPTH OF CUT TO CLEAN UP WHEN SIDE NO. 2 IS MACHINED
MACHINED SURFACE
TRAVEL OF WORK
ROUGH SURFACE
PATH OF CUTTERS

PRECISION COINING ON THE PUNCH PRESS

During the war economy drive on machines, labor and materials, stamping industry developed techniques for cold-coining vital parts to close tolerances. Peace production should benefit

FEW DESIGNERS and engineers outside of the stamping industry realize that a significant development in the expanded use of stampings in war production has been the greatly increased use of coining and sizing. Briefly, this process is used to produce different thicknesses on the same part. Though related to forging, in that structure and grain flow may be changed, the work is performed on punch presses, and no machining to size should be required. An almost endless number of items or parts of items have been produced on presses with the fine accuracy demanded in the manufacture of war materiel. Almost all these items will have many counterparts in peacetime mass production.

Cold coining and sizing as a secondary operation to blanking, drawing or forming metal has definite advantages in mass production of parts to close tolerances. Costs may be reduced, and improved physical characteristics may result. A leading engineer recently stated that if stamping engineers are given a free hand in redesigning articles they can redesign these to embody stampings, with the required accuracy for the function they have to perform.

WAR BOOSTS TOLERANCES

Before the present war, tolerances of .010" were considered good—today tolerances of .0005", .001", .002" are not uncommon. Coined stampings are now produced with sharp corners, whereas previously, only rounded corners were considered possible. Today many parts are coming off the presses with mirror or machine-like finishes formerly thought impracticable if not impossible of production without machining.

The shortage of machine tool facilities and skilled machinists in the early days of the war was the greatest single factor in the increased use of coining and sizing operations. In many cases serious bottlenecks were encountered. It was through the ingenuity and courage of leaders in the stamping industry that many war materiel schedules were met.

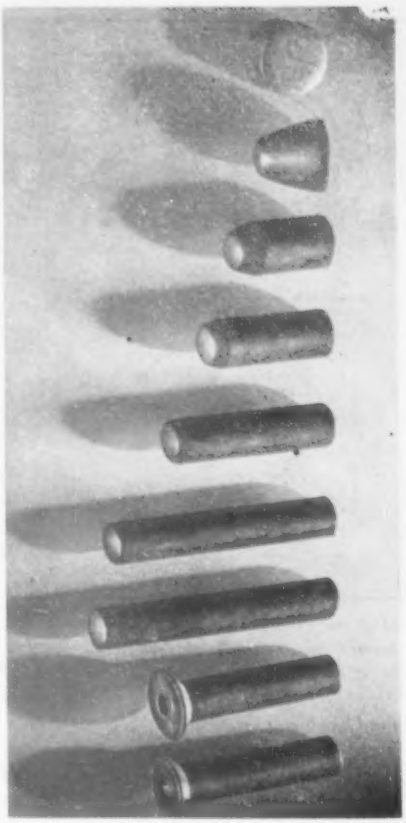
A striking instance of cold coining is a small cone shaped part used in the trigger control mechanism of a machine gun mount. When stamping engineers were redesigning this gun mount, this part was automatically listed as a machined forging.

STAMPING REPLACES FORGING

Two hundred per day were required. Fifty prospective suppliers were canvassed and all refused quotations due to lack of machines and operators. Finally one manufacturer agreed to supply 50 per day at $2.00 each. Obviously the production schedule on machine gun mounts could not be met on this basis.

Stamping engineers of the Heintz Manufacturing Company reconsidered this piece and redesigned the part as a stamping. The piece is now cold-swaged on a 400-ton knuckle press from a SAE 1010 centerless ground bar stock having a diameter of .578" plus or minus .001" and a length of 1.062" plus or minus .002". These tolerances are vital to the success of the completed piece. After swaging, the piece is drilled, reamed and milled with a final burring operation, and case carborized to a depth of.015". Production of a thousand pieces per day by this method was not difficult and the cost instead of $2.00 per piece was less than 30c.

Another interesting illustration of close tolerance production on presses is the primer for a 155-mm shell. The secret of success in the production of this primer lies in the cupping of the blank, the inside cavity must be held to .0005" tolerance. The sequence of operations as performed by Nagle-Chase Manufacturing is as follows:

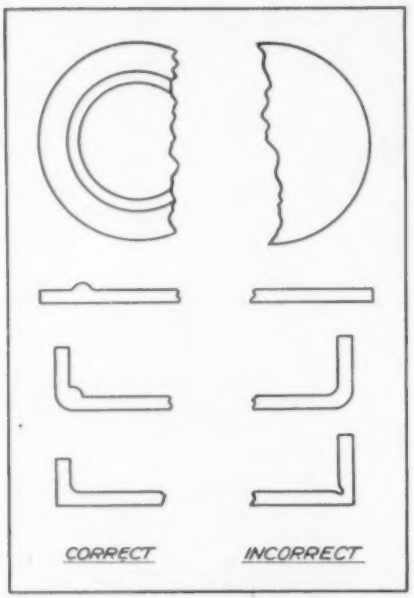


Pressed Metal Institute photos

Sequence of operations performed to produce primer for 155-mm shell. Inside cavity must be held to .0005".

Spline flange coined on 400-ton punch press. Flange is twice as thick as inner spline fingers.

Oil seal ring retainer is produced with sharp edges, a result usually considered practical only through forging or machining from bar stock.



One method of coining to produce a square corner is shown at left. Raising bead in blank, at point of inner radius, supplied metal to resist creasing when final coining operation forced flange back to fill corner. Result of forcing metal back without bead is shown at right. Crease and weakened grain structure occurred.

1. Blank
2. Cup
3. 1st draw
4. 2nd draw
5. 3rd draw
6. 4th draw
7. Thin
8. Head
9. Trim head diameter & pierce hole
10. Counterbore — the only non-press operation

The accuracy obtainable in press work is illustrated by a clutch plate spacer made as a stamping. Previously made as a machined casting, each plate had to be balanced dynamically and the holes drilled and surface ground. When made by the Acklin Stamping Company all balancing, drilling and grinding was eliminated. This redesign resulted in a cost of $21.00 per hundred as against $60.00 per hundred as a machined casting.

COST-CUTTING WITH STAMPINGS

A heavy edge spline flange used on an aircraft engine camshaft is also a close tolerance job. This spline flange is approximately 2-⅝" in diameter. Spline fingers are produced to a specification that demands accurate spacing within .002".

The interesting feature of this job is that the edge of the flange which is turned up must be twice as thick as the center spline fingers. The part, coined from SAE 1010, is produced on a 400-ton punch press. Press operations required are:

1. Blank
2. Coin
3. Anneal
4. Re-coin
5. Form
6. Pierce
7. Re-form
8. Coin, size, and thin spline fingers

To machine this part from forged or bar stock was obviously a slow and expensive multiple operation. Until re-designed by the Detroit Stamping Company, it was made as a machined forging at a cost of over $2.00 apiece. The coined stamping costs less than 10 cents each.

An oil seal ring retainer made on a press by this same company illustrates sharp edges and square corners, usually considered practical only in machined forgings, castings or bar stock. As a stamping this part is made from chrome-molybdenum in eleven operations as follows:

1. Blank
2. Coin
3. Anneal
4. Tumblast
5. Trim
6. Form
7. Re-form
8. Pierce
9. Heat treat
10. Burrblast
11. Size

The cost of this retainer made as a stamping is five cents each as compared with approximately $1.15 each when machined from bar stock.

Compared to production by other methods, particularly machining from bar stock, the result of coining should be of increasing physical toughness and of producing a superior grain flow. As with all methods, attainment of an objective, or solution to a problem may be difficult, in fact may at times be impractical. One immediate problem in precision work arises from the variance in material.

An interesting problem is that of producing square edges on the bottom O. D. of flanged parts, without folding the metal or weakening the grain structure on the inside radius. One method of overcoming this difficulty on a small part is to first coin a bead on the flat stock at the point where the bottom of the I. D. would occur upon bending. Then the sides of the flange are bent against this bead.

In the final operation, which is to force the flange downward so as to fill the "corner" or edge squarely, the extra metal on the inside radius prevents the creasing, and provides desirable additional strength. A drawing roughly illustrates the way in which this problem was solved. Obviously, the bending of the metal against the bead imposed a burden on the die. On some applications, this factor might make such a solution impractical.

To produce a machine-like finish on the relief valve breather, redesign combined coining plus wet deburring and polishing. Required results were obtained without machining. Production cost by Detroit Stamping was $4.00 per hundred as against $23.00 per hundred as a screw machine product.

FUTURE APPLICATIONS VISUALIZED

Although every one of the above illustrations is an essential part of some piece of war equipment, these same or similar items have thousands of potential uses in postwar products. The increased "know how" on the part of the stamping industry as regards coining operations and close tolerances will be invaluable in production of "lighter, stronger and lower cost" machines, equipment and appliances.

Pacing the development of precision forming techniques which have permitted production of interchangeable parts on presses has been the advancement of brazing and soldering processes. This has enabled mass production concerns to assemble stamped parts of varying complexity into integral units which may in themselves be components of a larger product. Previous to the adoption of such methods for manufacture of certain items, these components, or completed products, may have been machined from solid at a considerable cost in time, tools and materials.

THE END

CLEARING HOUSE FOR STAMPING INDUSTRY

The Pressed Metal Institute (headquarters Cleveland) is serving as a clearing house for the stamping industry. Through it, designers and manufacturers are put in contact with concerns interested in designing for production on presses, parts that require close tolerances, different thicknesses on the same part, machine-like finishes, and square or sharp corners.

During the war, developments in coining and sizing have been of great value in mass production. The Institute believes that the use of stampings in postwar will be substantially increased through these new techniques.

PRODUCTION

CHIEF AND TOOL ENGINEERING

Combination of box jig and elevating fixture is typical of economical tool standardization.

PRODUCT RE-DESIGN INTRODUCES NEW METHODS

In tooling to meet tough design requirements, and in boosting regular model output, Reliance Electric & Engineering Company has streamlined methods. Biggest job has been mass producing parts to higher precision specifications of a special D-C motor

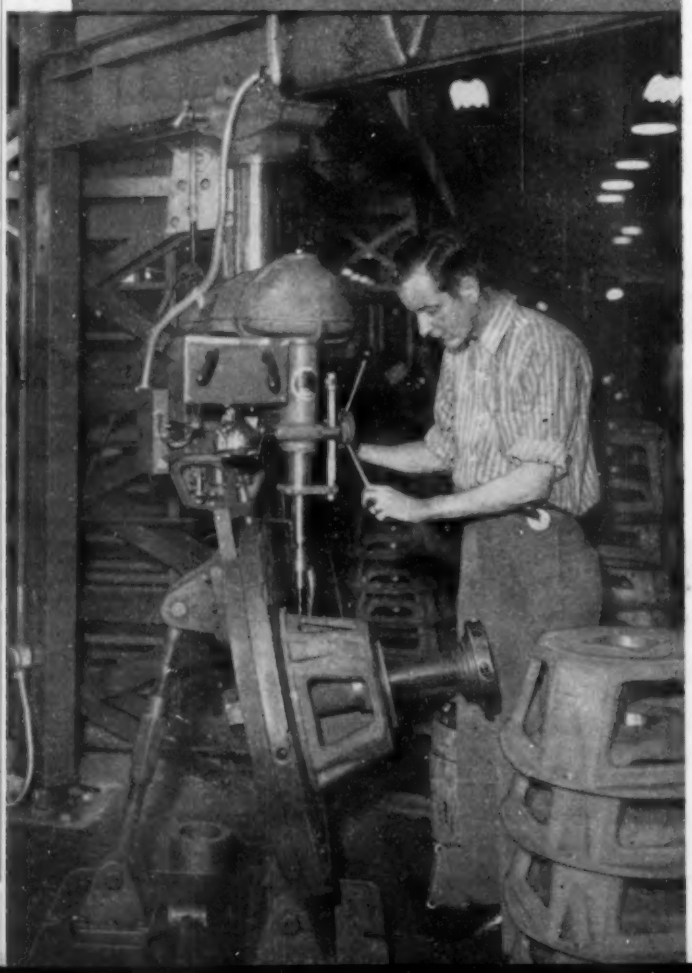
Streamlined Production

PRODUCT RE-DESIGN INTRODUCES NEW METHODS

MUCH OF THE EXPANDED production of electric motors for war uses has been a matter of tooling up regular models for higher output. It has not been easy, because, to a large extent, manufacturers have not had space increases at all commensurate with the rise in demand. Reliance Electric & Engineering Company of Cleveland has had it share of that kind of business.

In one of its plants however, an entirely new job was undertaken which challenged the company from one department to another. The order was for D-C motors to power merchant ship gun mounts—the catch was that the motors had to be of the same physical size as those used to power the same gun mounts on naval vessels. The Navy uses alternating current.

FIGURE 1. Reliance-designed jib crane structure holds small drill head used on heavy castings.



The difference in size between an A-C motor and a D-C motor of equivalent horsepower seemed to preclude any possibility of meeting the requirement. Forgetting the horsepower requirement, however, and fastening their minds to the particular job which the motor had to do, the engineering department developed a satisfactory power unit. The hitch would be in building it. Not only was the frame so crowded that precision had to be increased tremendously—just to get everything in—but the motor had to be built for installation with close relation to control levers and a gear reducer which it would drive. And after a motor was built, for trial, the Navy sent an end bell cover back with two dinges hammered in it, asking that similar depressions be stamped in the product to permit removing the cover when the gun was in a particular position.

As commercially manufactured, electric motors have always been built to an accuracy which met a broad range of requirements. The flange on the end of a motor frame used in driving a small centrifugal pump was manufactured to limits of .005". However, the marine installation built today is designed for limits of .0005".

Actually, though the gun mount motor job was set up in a separate shop to be free from the limitations of equipment and experience associated solely with commercial manufacture, many of the tooling ideas are those which Reliance production engineers had projected for commercial application. Much has been tried and tested which will be available as postwar manufacturing methods.

Extensive employment of women workers has resulted in job simplification—even on those jobs requiring higher accuracy—which will not be abandoned. Such operations as coil winding have been improved from a manual operation to semi-automatic. Though old machines have been refurbished out of necessity, and at some expense, there is every indication that this plant is in step, and ahead of the trend to place more and more burden for accuracy, speed and lowered parts rejections on properly tooled machines. Every effort is made to keep setup time low in relation to the time spent in machining.

Two types of equipment illustrate the ends to which Reliance production engineers have gone to attain and maintain a production advantage. In producing a highly accurate bore for installation of a ball bearing assembly, a modern automatic boring machine is used, supplemented by an air gage for highly accurate checking of the work

Mass manufacture of D-C motor of same size as A-C unit of comparable power, imposed problems in machining parts to higher accuracy and assembling them in smaller space

STAFF FEATURE
BY THE EDITORS

Reliance Electric & Engineering photos

Right: **FIGURE 2. Blanked laminations and scrap are separated automatically by this conveyer setup.**

while in the machine. Used on a specific job, this machine has paid its way.

For drilling operations where comparatively light drilling is performed on heavy castings over a large working area, the installation of a hard-to-get, long-arm radial press seemed unwarranted. Reliance personnel proceeded to design and build a jib crane structure to accommodate a small drill head—which satisfactorily supplied the expected accuracy and ease of operation.

An I-beam for a jib is suspended between roller bearings installed in brackets mounted on a structural column. (Figure 1). The arm, rigidly hung from the freely turned jib, serves as a monorail to carry a portable head which is smoothly and accurately raised or lowered by manual control. An adjustable-speed drive furnishes pre-selected speeds, with rapid reverse, for drilling and tapping.

Common sense tooling includes such devices as the conveyer belt which separates blanked laminations and scrap following removal from an automatic press.(Figure 2). Stator laminations and scrap include the ring-shaped work and the center which is segregated for salvage. As the work leaves the die, the center falls through a hole in the conveyer to a salvage belt, and the lamination is conveyed to an automatic jogger, a revolving, dome-shaped device which stacks laminations as a key connects with a keyway in the outer perimeter of the sheet.

MACHINING METHODS

Tooling has played such an important part in setting up the individual operations and the production sequence for manufacture of an unconventional design, precision-built D-C motor that tool engineers are largely responsible for the operation of Reliance's Marine Division.

The compactness of the motor has demanded working to the closest tolerances to assure a cleanly assembled job. Further, in view of the generally low supply of skilled workers, the close relationship specified between dimensions of independently machined parts has demanded job simplification of a high order. This factor has necessitated attention to a sequence of operations which would assure economical production of a unit to specifications.

Illustrating this last requirement is the performance of machining operations on the nearly complete assembly. Flange faces, to which the end brackets are bolted, are 19" apart, yet that distance must be accurate to within .006". Their height, with relation to each other must be accurate to within .0005".

An accumulation of error must be avoided, and here the conventional method of machining to an original reference is followed as closely as possible, using the shaft shoulder, which is located with reference to a bolt hole in one of the feet.

The flange surfaces are finished following complete assembly with the motor frame. Because the frame is heavy, and because the machining is done in close relation to the complete assembly, machining is performed by mounting a fly-cutter on the motor shaft, and turning the shaft through a small motor mounted adjacent to the work-holding fixture. (Figure 3).

Turning at 45 rpm, the fly-cutter consists of a block on which the tool holder can be advanced with each revolution of the shaft through the action of a modified star feed. Actually, continuous feed is maintained through an eccentric rod, sliding freely in but prevented from turning by a hole in a bracket on the holding fixture, and actuating a worm and gear and feed screw setup.

The flanges are finished to a precision of .0005" total indicator run-out on the fit and .001" total indicator run-out on the face. The end face of the flange is machined with the same setup, requiring only the insertion of a $\frac{1}{8}$" spacer between the fly-cutter and a shoulder on the shaft.

The final machining operation on the assembled unit is performed on the feet which must be milled to parallel the center-line of the frame to within plus or minus .005". Enough working surface is left on the feet to assure requirement of a cut across the entire face. The setup here is simply one of setting the frame on end upon a surface maintained in true perpendicular with relation to the milling cutter and with the horizontal center line of the flange of the motor parallel to the plane of the cut. Bolt holes drilled in the flange serve as reference for center line.

CHECKING RELATED DIMENSIONS

The finished motor is checked on a surface plate, with feet doweled to bolt holes fixed at the proper spacing. (Figure 4). An angle plate, keyed in a channel in the sur-

face plate, is used to check flange, rabbet and shaft heights, as well as the holes in the flanges of the end brackets. The very accurate relationship which must exist between end brackets and gear reducers to which the motor will be assembled for final use has imposed a peculiar requirement in the location of these holes. They are drilled so that a line on the diameter nearest the center line, that is extending from one hole to another, is .056" off the center line at the perimeter. In milling the feet for perpendicularity with the center line, the reference therefore is a point .056" from the center line.

Square hole feelers are used to check the height of the shaft, and a tapered spline gage is used to check against run-out. As much as possible, commercially supplied indicator gages are used in conjuction with angle plates and conventional height gages. The 19" dimension between flange faces is checked on a tubular-frame micrometer.

MULTIPLE SPINDLE DRILLING

The same accuracy which must be obtained in machining and drilling flange faces on the motor frame must of course be held in fabricating brackets. The front end bracket bolt holes are drilled in a multiple spindle drilling machine. Location is made with reference to a cast boss, with the center location being established by means of a bored hole. An index pin in the bottom of the jig is used to reference the holes in the flange in proper relation to holes in the opposite end of bracket.

FIGURE 3. After final assembly, flange surfaces are machined with fly-cutter mounted on motor shaft.

Streamlined Production

VERTICAL TURRET LATHE

A simple machining operation, in that the part is assembled only with relation to adjacent surfaces, is the facing of the ends and inner surface of the hand-hole covers which fit over the openings permitting access to the brushes. Four parts are clamped around a square holding fixture on the table of a vertical turret lathe for machining the ends which are shaped to include an arc and its chord. (Figure 5).

The accuracy of this surface is important in that the cover must fit smoothly within the streamlined contour of the bracket. Ends are machined with relation to the bolt holes. Carbide tools are used in removing metal from this malleable iron part, though space exists between the parts so that an interrupted cut results.

With the table turning at 100 rpm the tools cut to a ⅛" depth. Feed is at the rate of .014" per revolution. Diameter over the work is 20". A rigid tool holder is undoubtedly of help in cutting down the hazard of breaking tools. Between 80 and 100 pieces are machined between grinds, or approximately 25 setups can be made on the machine without changing tools.

In facing the inside surface of the hand-hole covers, a pot fixture is used to support the convex exterior, and a ram mounted in one of the turret posts is used to pin the part against the supporting fixture. (Figure 6). The ram has a floating or swiveled action, obtained by means of a rubber bushing inserted at about half its length. This is required to pin the part securely and prevent it from rocking. Accuracy to .002", checked by means of a feeler gage, is required because a stiff gasket specified for the assembly of the cover to the motor frame affords slight leeway.

Another application of the turret lathe permitted the use of carbide tools and assured good finish in boring through the length of the rolled steel motor frame. Because the work is long, the insertion of an unpiloted boring bar resulted in vibration of the bar and tool. The vibration was checked by bracing the bar with a rod mounted from a holder in the turret post adjacent to the one holding the bar.

High speed steel tools might have been used at slower speeds on this metal (SAE 1020) but some vibration would still have been present. The amount of metal to be removed warranted tooling for additional machining speed, as well as for the improved finish which resulted from using carbides.

A second operation on the motor frame consists of facing the end surfaces, and turning the exterior concentric with the bored interior. (Figure 7). Because the frame is footless, the cylindrical surface must be clamped securely to prevent slipping during machining. Previously, an elaborate combination of straps and a ring with set screws was used to hold the part on the fixture. Due to this method of clamping, eccentricities of as much as .050" were sometimes encountered.

The part is now clamped quickly by means of sharp-edged blocks which are tightened down around the bottom of the part at an angle. The blocks actually bite slightly into the metal thus preventing slipping, and at the same

FIGURE 4. Extreme accuracy in checking finished motor is achieved by bolting unit to a surface plate.

FIGURE 5. Four parts of cover are clamped around a square fixture for machining on a vertical lathe.

time hold the part down and in against the hardened and ground locating surfaces of the fixture.

Two interesting aspects of producing V-rings to hold commutators are presented in machining and in gaging. High accuracy is required to prevent run-out of the commutator, and using the old type of pin gaging the 30° angle turned in the ring, required more than usual skill on the part of the operator.

The angle is machined from the cross-slide, though not with a conventional tool holder. (Figure 8). The tool is movable on a 30° slide which is a part of the tool block. The tool block is held in the square turret. A ram projecting from the hex turret advances the tool against spring pressure. This operation follows rough and finish turning of the O. D., and facing the part to length.

O. D. and length of the V-ring are checked in a ring gage, the main surface of the ring indicating the maximum height and a small recessed surface indicating minimum. (Figure 9). With the part still in the ring, a tapered plug is inserted within the formed inner perimeter. Visual inspection should indicate that the plug fits flush with the feather edge of the ring, and feel should not indicate any rocking motion.

An oil seal must be mounted between the motor and the gear reducer to which it will be connected. The seal, of course, is part of the motor assembly and prevents oil getting into the motor. Though a shoulder is turned on the shaft as accurately as possible, and the entire frame is assembled with precision, the relation between the seal and the inner cap must be so close that any slight variations in the location of the seal must be compensated for by final machining of the inner cap. Therefore, with the back end of the motor assembled to provide proper pressure on the back end seal, a dummy bracket is mounted on the

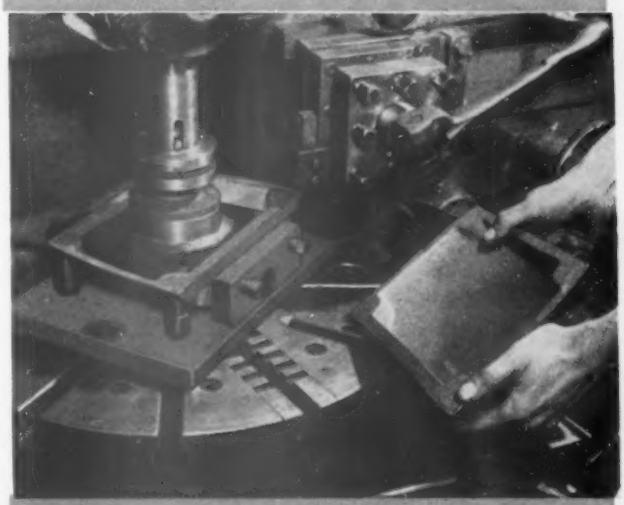


FIGURE 6. For machining on Bullard vertical, a ram mounted in one tool post pins part to pot fixture.

front end of the motor and measurements are taken of the relation of the shaft shoulder to the face of the motor frame. The results are incorporated in the actual machining of the back end inner cap to be used.

BORING ASSEMBLED LAMINATIONS

In contrast to the usual method of grinding assembled laminations in the stator, Reliance production engineers have found boring the laminations is a method which constitutes a notable production advantage. In the expanded production for war, when equipment was scarce, a stator boring machine was built of material literally salvaged out from under the junk man's sledge hammer.

An old drill press frame of sufficient elevation was braced and equipped with a portable head and spindle. (Figure 10). A single boring bar was designed to carry different heads for the various diameters which would have to be bored. A holding fixture was provided to produce con-

centricity between the surface to be bored and the previously turned bracket fits of the frame. This was accomplished simply by clamping the part on a flat surface and against two columns with concave inner surface permitting the part to nest firmly in place.

Some experimentation was required in determining the correct combination of feed and speed for machining the silicon steel stampings in their assembled form. An rpm resulting in between 400 and 1200 surface feet per minute was assumed to be the high and low limits, and a feed of from .003″ to .006″ was considered as within the correct range. However, just what combination would prove best was difficult to determine.

By mounting variable speed drives on the spindle and on the feed, the experiment was accelerated considerably to a determination of a speed of 1200 surface feet, and a feed of .004″ per revolution of spindle. With these values fixed, it was possible to eliminate one of the drives and control both feed and speed from a single unit.

FIGURE 7. Fixture reduces eccentricity of motor frame while facing end surfaces and turning exterior.

The effect of design changes and production to precise specifications on the gun mount motor will undoubtedly have its effect on the commercially produced motors which will be made available following the war. As with other war products, the search for ways of conserving materials and speeding production are not simply matters of expediency. They are resulting in new methods which are receiving widespread acceptance.

RE-DESIGN TO SAVE MACHINING

One project saving which indicates the type of thinking being done at Reliance, affects the fabrication of braces which hold the stator, and which are welded at each end within steel rings. Conventionally, a brace cut from bar stock has served, but variations in stock size of as much as 1/16″ were necessitating a machining job. In the search

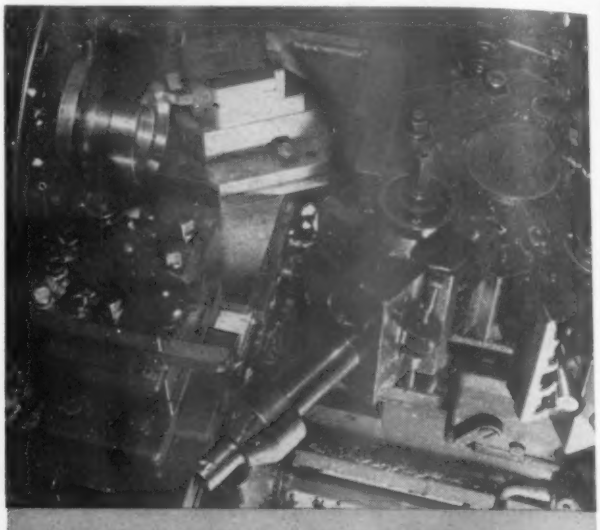


Figure 8. Turning 30° angle in V-ring is done with tool advanced by ram projecting from hex turret.

for stock which would be of guaranteed size, the decision was made to fabricate the part from heavy gauge metal, the replacement of machining with stamping being a faster operation.

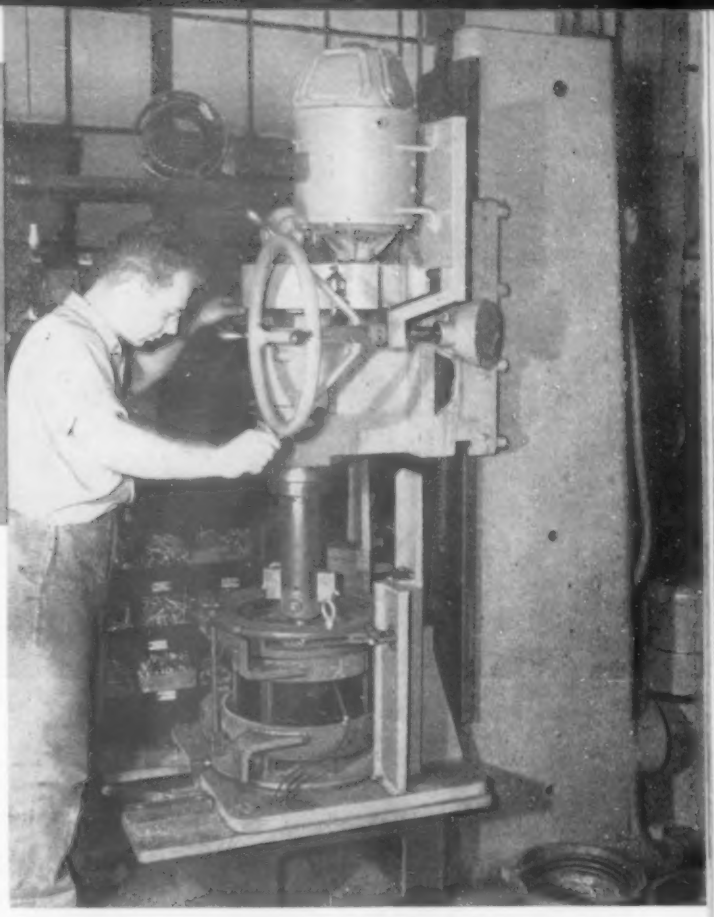
•

With attention on the re-design of this part, the engineers saw further opportunity to eliminate certain tedious operations pertinent to welding the assembled laminations to the braces. As joined to bar stock, it had been necessary to hold the laminations under pressure while welding. Because the compression would have to be maintained as welded, several welds are necessary. This assembly was then welded within the holding rings, and any variation in bar size from specifications was corrected by turning the rings to the proper O. D.

The fabricated brace is stamped into a channel shape from flat stock. The outer edges are flanged outward so as to conform to the diameter of the ring to which they are then welded. The inside surface is so shaped that for the portion on which the laminations seat, the laminations have full contact with the brace. Beyond the lamination seat the inner surface is coined downward forming a very satisfactory shoulder to locate the core axially. The entire operation is done at one stroke. The coined shoulder

Left: **FIGURE 9. O.D. and length of V-ring are checked in ring gage. Simultaneously, a tapered plug is inserted for visual test of interior fit.**

Right: **FIGURE 10. To bore assembled laminations, Reliance salvaged an old drill press frame to hold a portable head and spindle.**



was responsible for eliminating one welding operation and reduced the cost of the assembly fixture by about one half.

AUTOMATIC WELDING

A high production welding device has been applied to joining circular or cylindrical parts. (Figure 11). Known as a ring welder, the combination of an automatic head for flux and wire feed and an automatic positioner can handle diameters ranging from 3″ to 18″.

On larger work, table speed is between 30″ and 35″ per minute. With a variable speed drive on the table, or positioner, and amperage control coordinated with the feed of the wire, an infinite combination of bead depths can be produced. Once these factors have been determined for a given job, it is a simple matter for an unskilled person to operate the machine.

As used by Reliance in welding sections of motor frames together, a bevel must be machined on the outer surfaces of the parts to provide a V-groove at the joint. Obviously this is required where mating surfaces are to be joined flush. In welding surfaces perpendicular to each other, such as a ring to a plate, there is no requirement for grooving. Adjusting the positioner to an angle of 30°, or thereabouts, the angle of the joint is sufficient to hold the flux and to present an angle for the confinement of the bead.

Such a flexible unit has permitted high activity welding of a large variety of components. However, in tooling of a narrow or limited application type, it has not been considered economical to invest in high production jigs and fixtures. Few machined parts on commercial models are produced in lots of more than 50 or 100 because of the continual modification to suit customer specifications.

STANDARDIZED FIXTURES

However, as much standardization as possible has been achieved in the engineering of certain types of clamping fixtures and drill jigs. This has permitted a broad application of equipment facilitating handling of work, and has relieved the operator of the burden of any setup which can be eliminated. (See Frontispiece).

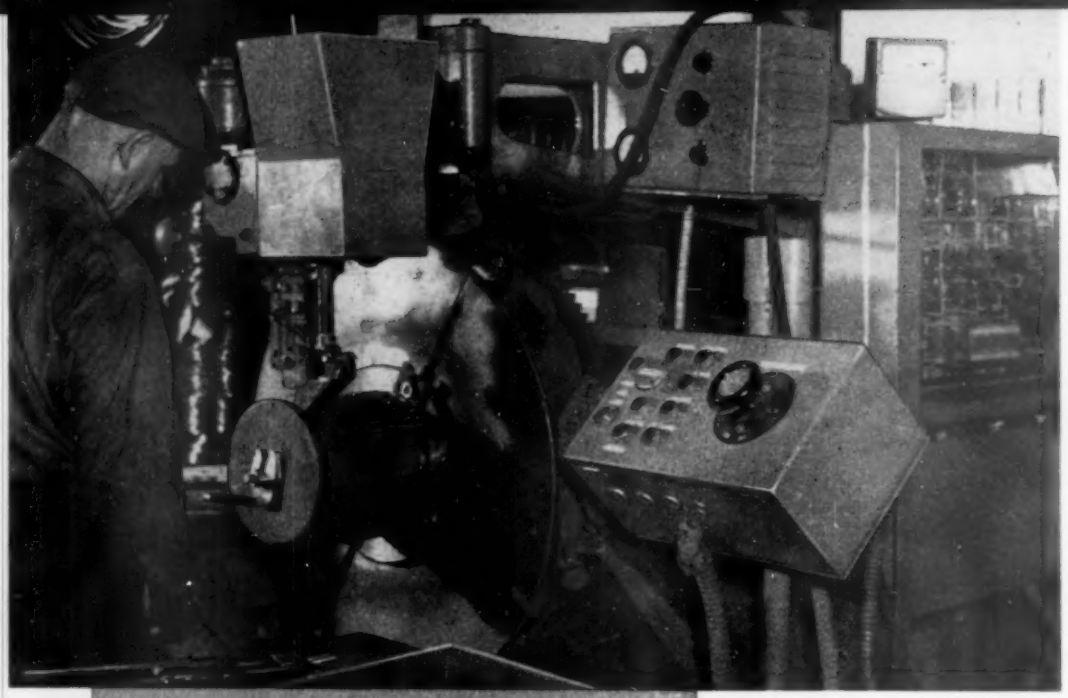
Standards in the specification of materials and treatment for drill jigs indicate the limitations which have been accepted by tool and production engineers. Where accuracy of less than .002″ is required, locating surfaces are not hardened, and bushings not specified. For production of 1000 parts or less, boiler plate has proved satisfactory as a locating plate. For more than this production, high carbon steel is used.

With a master adaptor, it is a simple matter to provide drill plate to a standard size which can be furnished with bushings in accordance with specified locations. In the same way, trunnion fixtures, box jigs and "pump" fixtures which raise a range of work sizes to a standard jig height, are applied to a variety of jobs. Pump- or elevator-type jigs are used particularly with heavier work. Cup-type jigs, which are simply laid over the work without benefit of clamps, are economical for short runs and can be produced at a saving justifying setup on a multiple spindle drill.

In conjunction with drilling bolt holes in motor bracket flanges, radial drills are used with a variety of hinged jigs which fit a permanent fixture. Jigs are available to cover a diameter range of from 17″ to 36″. Work is mounted on a turntable which also can be offset with relation to the fixture to which the bushing plate is hinged.

FACING FROM THE TURRET

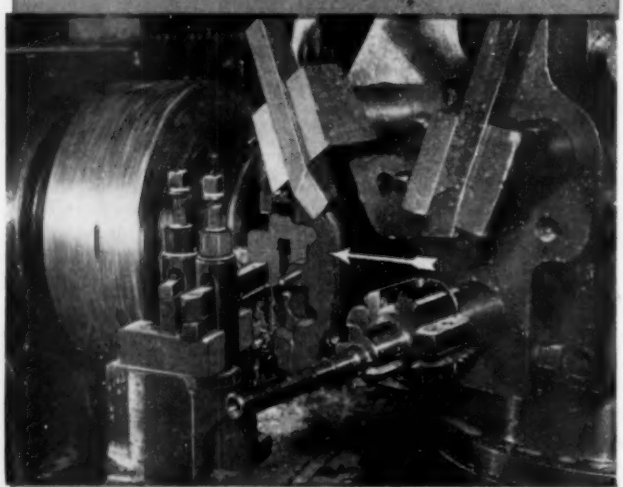
In tooling the turret lathe, Reliance tool engineers have developed a tool holder which can be mounted on the turret for facing across a surface which cannot be reached from the cross-slide. (Figure 12). Such a surface might be inside a flange. The tool holder consists of a sliding block on which tools are mounted, and which fits within a stationary block that is mounted in the turret post. The cross-slide feeds against the block on the turret, and a spring maintains tension against the cross-slide so that the tool does not "hog" in.



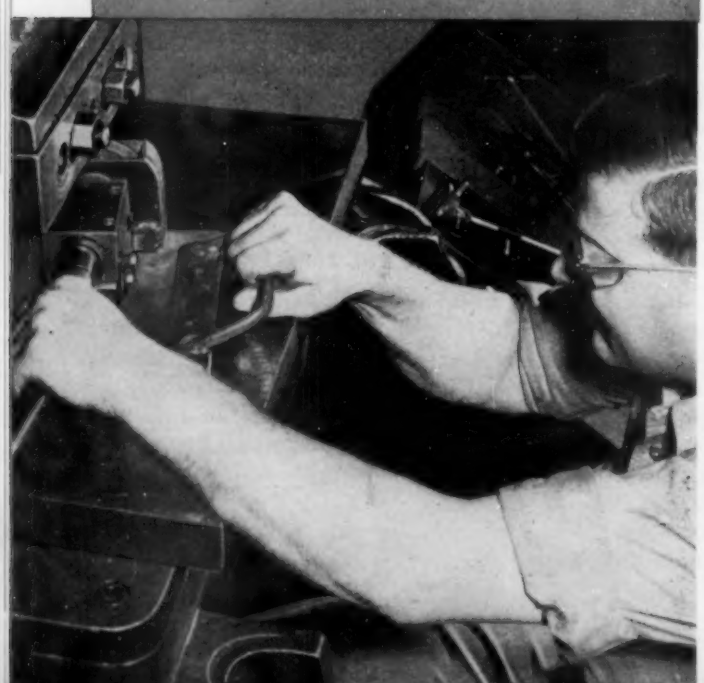
Left:
FIGURE 11.
A high production welding device has been applied to joining circular and cylindrical parts.

This ring welder, with its automatic positioner, and flux and wire feed, handles diameters from 3" to 18". Little skill is required to operate.

Below: FIGURE 12. Turret-mounted tool faces a surface which cannot be reached from cross-slide.



Below: FIGURE 13. Fine parallelism between ram and bolster plate is maintained by grinding wheel setup.



INCREASING DIE LIFE

As is usual in producing short runs of particular lamination patterns for stators and rotors, indexing presses are used. High-carbon, high-chrome dies have proved satisfactory for these notching and blanking operations, with 10,000 to 16,000 impressions per grind being normal. As many as 37,000 strokes have actually been recorded for one die. Several factors are responsible for this better-than-average life, but one which seems immediately responsible is a method (for which patent application is pending) of maintaining parallel surfaces between the ram and bolster plate.

A 4″ grinding wheel is mounted on a mandrel supported above a flat plate, with the axis of the wheel parallel to the plate. (Figure 13). With the plate set up on the bolster plate of a press, and the grinder hooked to a flexible power cable, it is a simple matter to maintain parallelism between ram and bolster plate. Where rams at one time were found to be out of parallel by as much as .010″, the average deviation in six months is now only .003″. By removing .003″ or .004″ of metal from the bottom of the ram, the wear on the dies and on the press itself is held to a minimum. Naturally, a certain amount of press wear still occurs, but because it is not economical to tear a press down within certain limits of wear, this maintenance method serves to compensate for the wear to the fullest extent.

The success of this method in maintaining die life on indexing presses has led to its application on all types of presses which Reliance uses in producing laminations for motor stators and rotors.

One interesting deviation from regular procedure is the application of die-sets in an upside-down position. Purpose of this is to provide lubrication for guide pins, in that the bushings which are located in the lower die shoe can be packed with grease. Again, press wear and die wear are minimized by attention to smooth operation.

THE END

Oil Field Shops Demand Top Tooling

Producing machines and tools which lowered drilling costs qualified Tulsa manufacturer for important war production

GERALD E. STEDMAN

TOOL AND DIE SHOPS in Tulsa, Oklahoma are equipped to answer more than peacetime requirements of the oil fields. With a more than 400 per cent increase in employment to produce a broad range of war products, they have also added new equipment and increased their skills. Though these machine shops tend to be small, they are possessed of excellent engineering and designing abilities. As deep drilling of oil wells has become more the practice in recent years, tooling requirements have demanded more accuracy, which has encouraged precision methods that rank well with any to be found nationally.

A case in point is the Baird Mfg. Company, whose senior partner is L. D. Baird. He started as an oil well supply store man, acted as an oil scout, identified himself with a producer of oil field pipe, and developed the Ajax gas generator which extracted gas from oil to operate oil field engines. Organizing his own company in 1923, Baird invented a series of successful oil field tools, such as the positive lift standing and traveling valve, an expansion type wrist pin, a portable crank hole reborer, wrist pin puller, and a ball and seat lapping machine.

BROAD RANGE OF PRODUCTION

To meet war needs, the Baird Company is fabricating aircraft parts (both general tools and production pieces), punches, dimpling tools, dowel pins and broaches. It is machining such parts as a bottom hydraulic reservoir outlet for Douglas; forming, drilling and reaming gear blanks to tolerances minus O, plus .0006", and grinding machine gun mounts and trunnions. The shop is equipped with a large variety of tools rarely found in one of its size, such as turret and engine lathes, grinders, screw machines, millers, drill presses, lapping machines and metal saws.

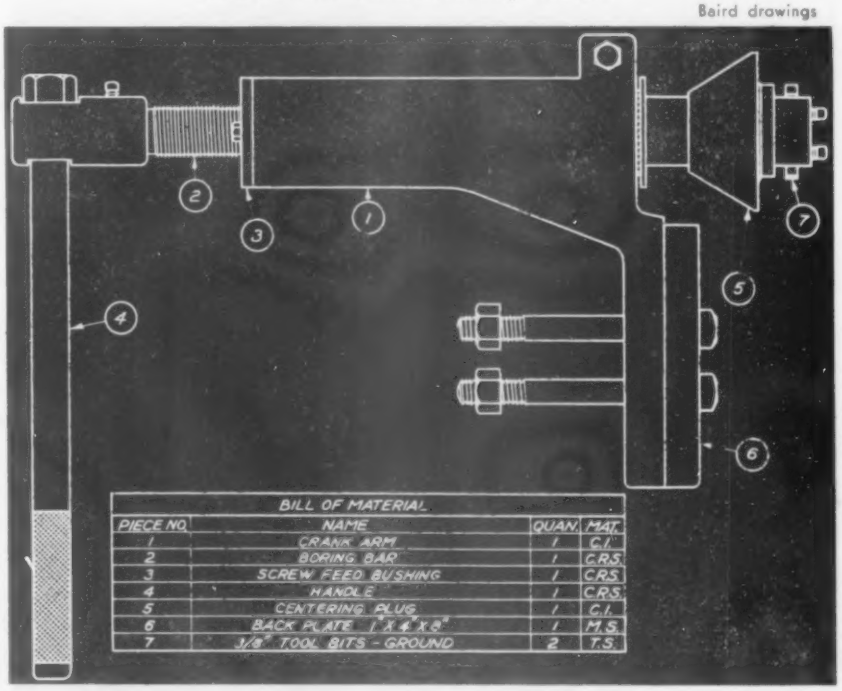
Still of high interest among precision metal-working applications are Baird-designed machines for oil field tooling, such as a ball and seat lapping machine. The two heads of this device are carefully engineered to a precise angle. This is unusually important in lapping balls and seats for oil well pumps because any off-angle would cause faulty oscillatory revolution in all directions, destroying the seal.

One head of this machine moves clockwise, the other counter. Belt driven by electric motor, a reducing governor controls speed around 1100 rpm. Both heads are movable, one side having a spring adjustment while the other is locked stationary. The spring adjustment facilitates easy feed of balls and seats. Individual screw-type chucks accommodate the 100 varying seat diameters that are lapped. In lapping, the seats are inserted in the collets and a locking ring is screwed down. The ball is placed between the two seats and lapping compound (abrasive) is applied. They are run to precise timing, then turned to be lapped on opposite sides.

A Baird designed ball and seat fluid bubble type testing machine is another example of the shop's ingenuity. This employs a 60 cycle A-C motor with a built-in vacuum pump, to which there has been added a fluid container and a testing base, faced with rubber, upon which the seats are set to be tested, after careful solvent cleaning and wiping. The ball is set in the seat on this base and rotated in all directions. Any fault in the seat is signaled by air bubbles in the fluid container. The suction tube which enters the fluid container is disengaged between tests by means of an adjustable tipping arrangement that rocks the tube out of position and prevents fluid from being sucked into the pump and out through the exhaust.

FIGURE 1. Crankhole reboring machine.

Baird drawings



BILL OF MATERIAL

PIECE NO.	NAME	QUAN.	MAT.
1	CRANK ARM	1	C.I.
2	BORING BAR	1	C.R.S.
3	SCREW FEED BUSHING	1	C.R.S.
4	HANDLE	1	C.R.S.
5	CENTERING PLUG	1	C.I.
6	BACK PLATE 1"X4"X8"	1	M.S.
7	1/8" TOOL BITS - GROUND	2	T.S.

Baird now produces balls and seats for synthetic rubber pump installations which are lapped and tested on these bubble machines. Because of the perfection of method, Baird has a large seat reconditioning service among oil field producers, covering all makes of seats. The company has developed a significant improvement in seat design, which incorporates two lapped faces, separated by a recessed elliptical groove that acts as a fluid cushion to the downward impact of the ball before the final seating on the lower lapped face to complete the perfection of fluid seal closure.

BALL UNDERGOES TOUGH SERVICE

In the usual oil well pump operation, the ball makes up to 50,000 impacts each 24 hours, and under bottom hole pressures, as high as 3000 psi. Best metal, lapping and seal are highly important. These "Double Seal" seats are formed, rough lapped, shipped out for heat treatment, and returned for grinding to specified O. D. and finish-lapping.

An oil field tool, produced to high precision, is a portable machine designed for the reboring of wormed and egged holes in the iron crank arm of any type of rig eliminating the trouble of continuously shimming up to keep wrist pins tight (Figure 1). The constant motion of the Pitman arm of the rig on the crank raises havoc, causing much shut down and replacement expense unless crank holes are rebored frequently. This Baird design is portable enough to travel from rig to rig easily. Bolted to the crank arm, centered by tapered plug in the old hole, an adjustable cutter bit is inserted in the boring bar and set to the new hole size by diameter gages. Reboring requires about an hour by any lease man.

Another Baird product is a unique socket fishing tool. Oil pumping action induces strain on rods, often causing them to part—and they must be fished out. They may strip threads, come loose at joints, hang up at the bottom of the hole, or pull the rod in two; all of which are bugaboos of the pumper's life.

Lack of proper fishing tools may require pulling the tubing before going in to fish for the parted rod which entails high costs in time, shut down, lost production. The fishing tool assures a positive catch of box or rod breaks and the socket can be equipped to engage any fractured rod standing in the tubing. Requiring no jar down or screw on to anchor the grab, the tool can be run in on a wire line instead of sucker rods to speed up fishing in deep wells if desired.

This tool consists of (1) a top, (2) a tapered barrel, threaded to screw onto the top, (3) a tapered slip with wickered teeth threaded to receive the sucker rod, (4) a spindle and spring which screw into the slip, (5) a release button and spring which engages the slip spindle.

The fished piece, entering the slip, is caught by the action of the automatic trip of the release button, causing a downward slide of the slip which catches the piece in the internally tapered barrel. The greater the subsequent pull, the stronger the clutch. The socket is easily pulled off the catch and reset without damage to slip or barrel by pushing it down on the piece fished out and pressing the release button which resets the slip in the barrel. Other types of fishing tools must be entirely disassembled.

INGENIOUS WRENCH DESIGN

"We have tool designing skills that encourage us to tackle any problem. Though our ideas have largely centered in the oil field business, war experience shows we can ably tackle any need," R. J. Wertzberger, general manager, explained, in demonstrating Baird ingenuity in designing a circular rod wrench.

Often, the rod string in an oil well must be considerably twisted, storing up dangerous energy, which may cause a hand wrench to get out of grip and spin violently, forming a lethal weapon that has badly injured many workmen. Baird solves this with a wheel wrench design (Figure 2) in which the rod grip is slotted to a large diametered wheel, held in place by a hand screw and wedge which permits the gripping element to be easily slipped in or out, but prevents it from separation from the wheel. Thus the fulcrum ratio of the hold is increased, there is nothing sticking out to hit the operator, nothing to fly off and absolutely no hazard to man or equipment.

Baird regularly improves on its own basic designs. For example, it has effected an improvement on regulated travel and guided valve seat control. "This is made possible by designing the valve and seat to be a complete unit," Mr. J. B. Cook, production foreman and chief draftsman, explained. "The valve cannot come

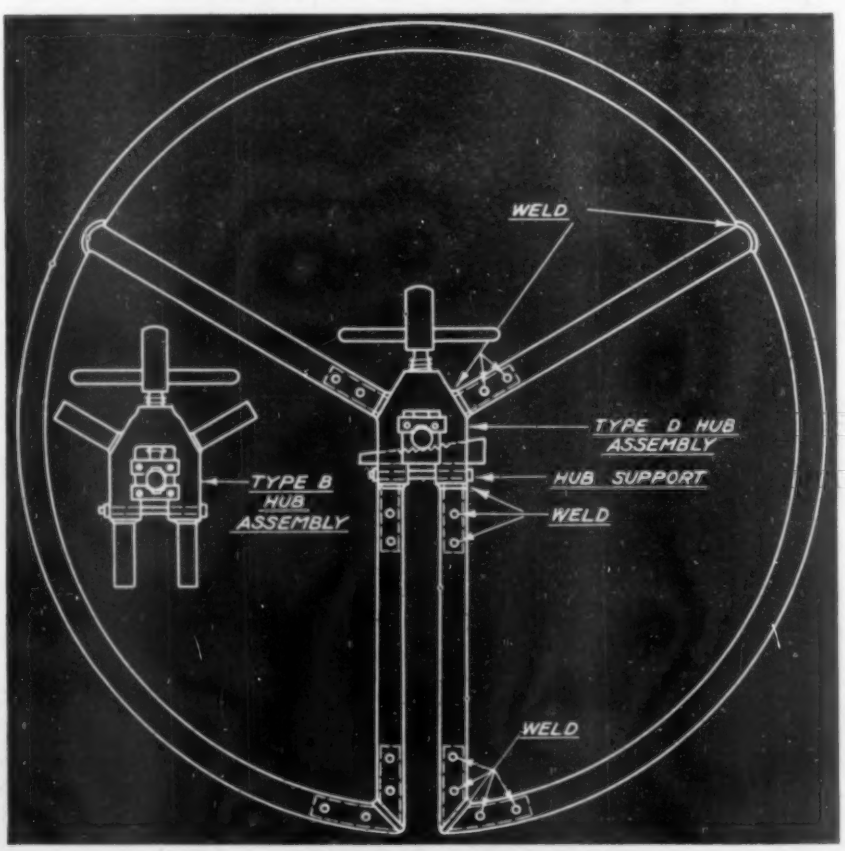
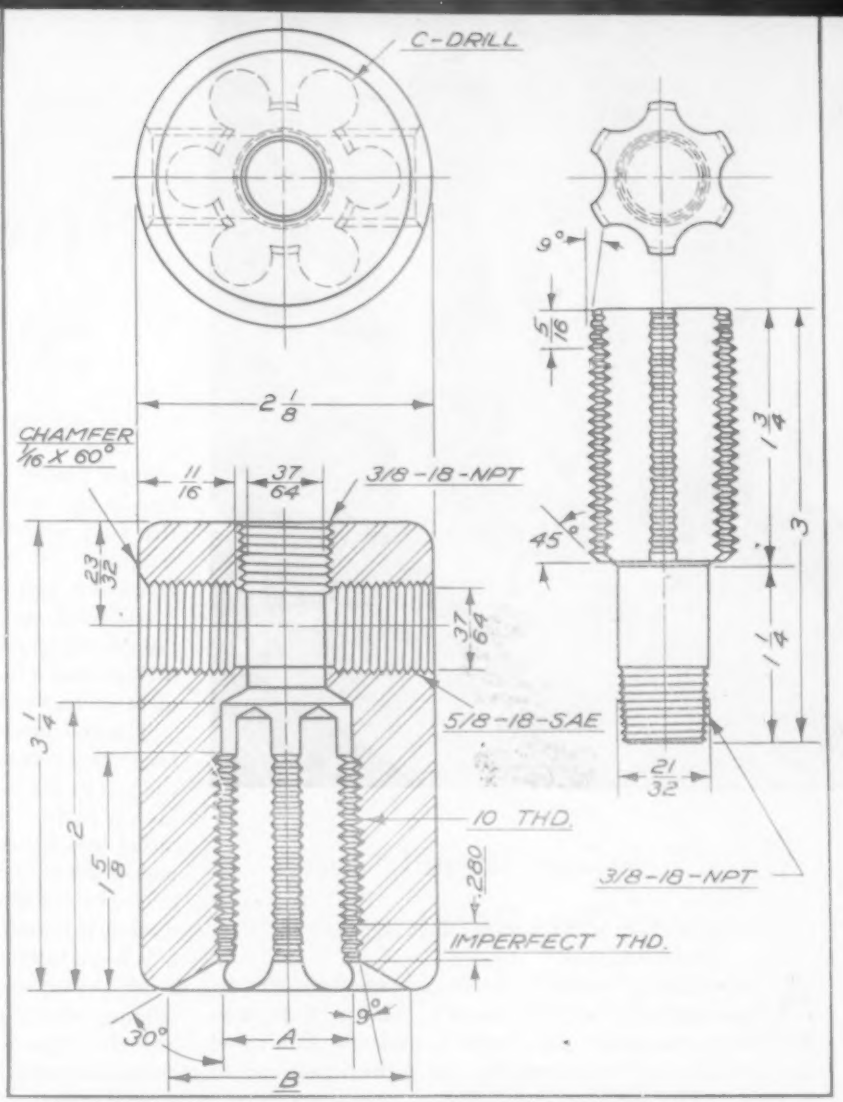


FIGURE 2.

Wheel wrench grips rod firmly; will not fly off if twisted rod lets go.

FIGURE 3.

Taps and dies produced for cleaning and re-chasing box and pin threads when sucker rods are run back into the well to remove dirt, sand and scale.



OPERATIONS: 1—Thd., chamfer 9° angle and cutoff tap. 2—Face, drill tap ⅜-NPT, rd. corners. 3—Drill, tap, screw tap in die, turn & thd. for ⅜-NPT. Face, rd. corner. 4—Use jig & drill holes "C" in tap & die at same operation. 5—Remove tap from die by turning to right with spc. wrench. 6—Drill die in jig for ⅝-18-SAE thd. 7—Tap die for handles. 8—Stencil die (size and co.). 9—Face tap on disc & stencil size. 10—Chamfer & make 9° angle on thd. in die. 11—Chamfer thds. on back end of tap.

out of the seat. It requires no special pump body, or cage for installation. Fluid slippage is reduced by its quick seating characteristics, making possible long continuous pumping runs at much reduced maintenance cost. The pin is guided through the center hold of the body, the latter having six holes to accommodate fluid flow. The seat cylinder is ground to API specifications plus O, minus .002". These pump valves are tested on the same bubbling apparatus."

Another evidence of good Baird design and machining is the sucker rod taps and dies produced for cleaning and re-chasing box and pin threads. This is shown in Figure 3, and involves 11 operations which are detailed thereon. This tool is not intended for use to cut new threads on blank rod round. It can be used when running sucker rods back into the well to remove dirt, sand and scale from the box and pin threads before screwing up to insure proper tightening and shouldering of joints.

"We have by no means exhausted the possibilities of designing and making oil field tools," L. E. Robinson, plant superintendent, said. "For example, we are now redesigning our 'on and off' coupler which is a great facility in releasing sucker rods from the traveling valve of an oversize pump or from an insert pump.

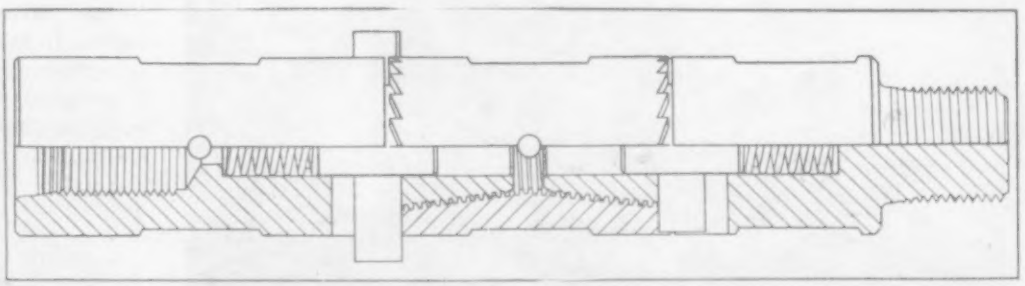
"The object of this tool is to connect or release the sucker rod when oversize pumps are installed on small tubing, without stripping the well; for use in wells where no danger of sand sticking the plunger might occur. A special tubing coupling is placed above the pump barrel usually on a four foot pup joint and the lower two thirds of the sucker rod releasing tool is installed on top of the plunger and is placed in the barrel when the tubing is run. The upper third of the sucker rod releasing tool is placed on the end of the sucker rod string.

Connection is made by lowering the sucker rods until sufficient weight is placed on the plunger to prevent it from rotating when the sucker rods are turned to the right. After a good twist is induced in the sucker rod string with the rod wrench, it is held and the weight of the rod string is lifted until a spinning is felt in the rods; this spinning causes the upper threaded connection to be screwed together and it cannot unscrew, due to a locking arrangement.

"To disconnect the sucker rods from the plunger, the rods are raised until the rod releasing tool enters the special tubing coupling which in turn releases the locking arrangement of the left hand joint and rotation of the rods to the right releases them. In connecting or disconnecting, all rotation on the rod string is to the right. The tool's facility in permitting the unhooking of rods from oversize pumps without pulling the tubing results, of course, in unusual savings in labor and shut down time, thus greatly increasing fluid production." A sketch of this coupler is shown in Figure 4. THE END

FIGURE 4.

On and off sucker rod coupler releases sucker rods from traveling valve of an oversize pump, or from an insert pump.



TIME and TOOL SAVERS

Glenn L. Martin photos

Safety Insert Cuts Tap Breakage

A NEW SAFETY INSERT for tapping heads developed by three employees of The Glenn L. Martin Company, Baltimore, Maryland, has almost completely eliminated tap breakage on jobs where this factor previously ran as high as six taps per eight-hour shift.

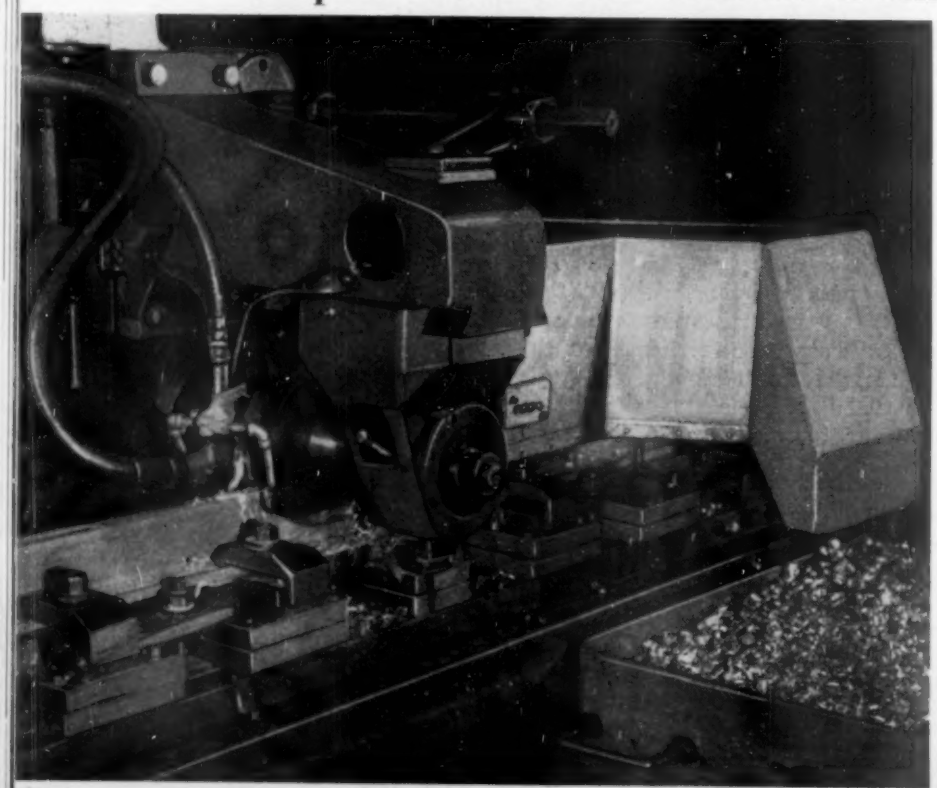
Two jobs where the breakage factor ran particularly high were the tapping of hard, heat-treated steel gun charger plates and bomb bay window racks. Further, broken taps would so jam into the holes being threaded that fifty per cent of the work with broken taps had to be scrapped. Since tapping was the final operation, man hours and materials lost were considerable.

Bill Stull, second shift departmental supervisor of Detail Manufacturing, Fred Lang, second shift foreman of drill presses and Ed Lapoz, second shift general foreman of Machine Shop tackled the problem.

The new insert is a grooved piece of Zamak, a soft alloy, which replaces the steel jaws formerly used to hold the tap in place. It is identical in size and shape to the jaws it replaces except that where the jaws are in two pieces and adjustable to take various sized taps, the Zamak insert is cast in one piece and each insert can be used only with the size tap for which it is designed. It can be used in any kind of tapping head.

When a tap jams, the soft metal of the insert slot wears away, permitting the tap to remain stationary while the tapping head continues to rotate. The metal is soft enough so that it gives away before sufficient force is generated to break the tap, but hard enough to hold during normal operations. By rotating the insert to a new position each time a tap jams, the same insert may be used about 15 times, after which it can be melted and recast.

Chip Removal From Extrusion Milling Machines



GLENN L. MARTIN EMPLOYEES are credited with suggesting an ingenious compressed air attachment for removing chips from extrusion milling machines. Twin jets of air are directed on each side of the milling cutter by means of copper tubing. The air current carries the chips into a duct attached to the machine, and they pass from the end of the duct into a mobile receptacle.

Prior to this invention, one worker was constantly required to brush the chips from the bed of the milling machine. Today this man is relieved for other duties. At the same time the new device relieves maintenance workers from sweeping up chips that formerly covered the floor. Finally, it segregates scrap at the source and keeps the chips from being contaminated by dirt and chips of other types of metal.

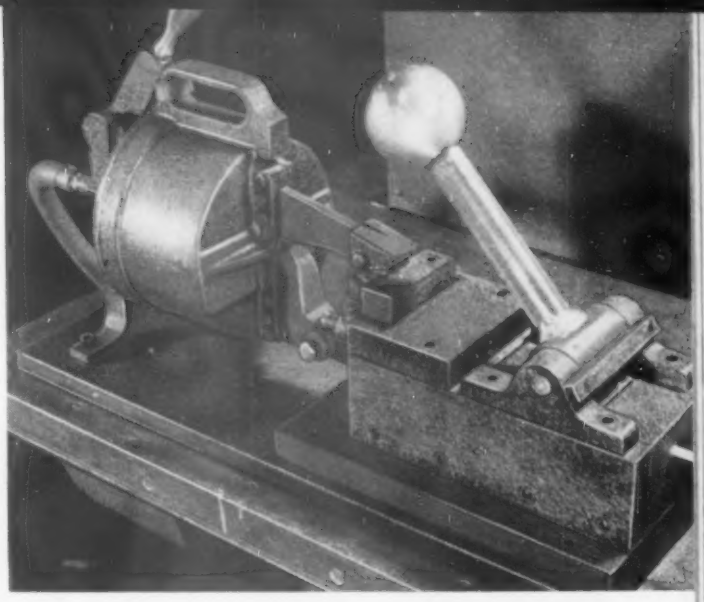
PRODUCTION AIDS LOWER COSTS IN AIRCRAFT PLANT

Improved Tube Beading

A TUBE BEADING DEVICE invented by Frank J. Nickel, tool repair man at The Glenn L. Martin Company, has effectively solved the small diameter tube beading problem where ¼" tubing is used extensively.

Where conventional beads are rolled from the inside—difficult on small tubing because a shaft small enough to fit inside the tube is easily broken—the new device produces the bead by squeezing. The machine consists of a pneumatic squeezer with two sets of blocks cut out for ¼" tubing. One set of blocks is stationary and the other movable. In each set of blocks the ¼" hole is enlarged to a cup shape at one end.

The tube is clamped securely in the stationary blocks, with the end upon which the bead is to be raised extending out through the cup shape opening and into the movable blocks where it is likewise clamped. Both sets of blocks are actuated by a cam clamp. A pneumatic cylinder pushes the movable blocks forward, compressing the tube which expands into the cup shaped recess to form the bead. Weight of the bead is controlled by the movement of cylinder arm and size of cutout in the blocks.



The new method shortens the tube about ⅛" but this can be easily compensated for in the development of the true length. At the same time, the new tool increases the wall thickness of the tube in the area around the bead, adding to the strength of the bead.

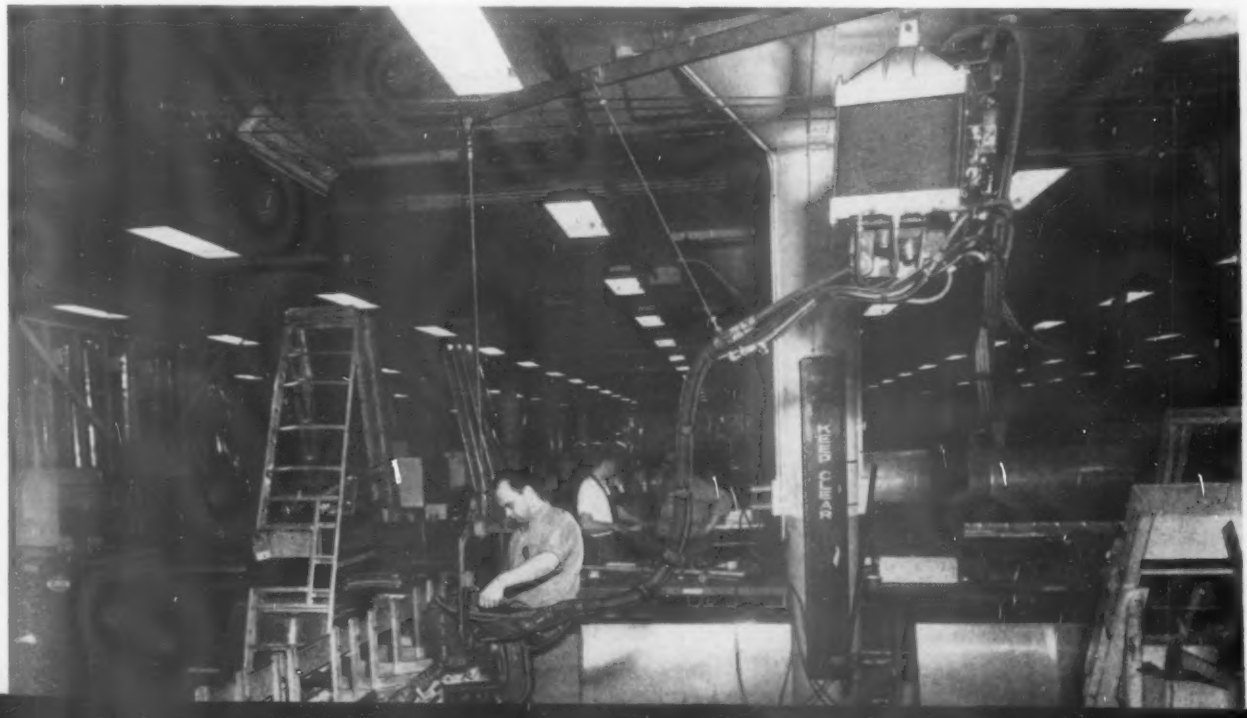
Portable Welder Cuts Assembly Time

THE PRODUCTION OF B-26 bomb bay doors by The Glenn L. Martin Company, already speeded through the use of spotwelding has been further simplified and accelerated with the introduction of a portable spotwelder to tackweld parts together in the assembly fixture.

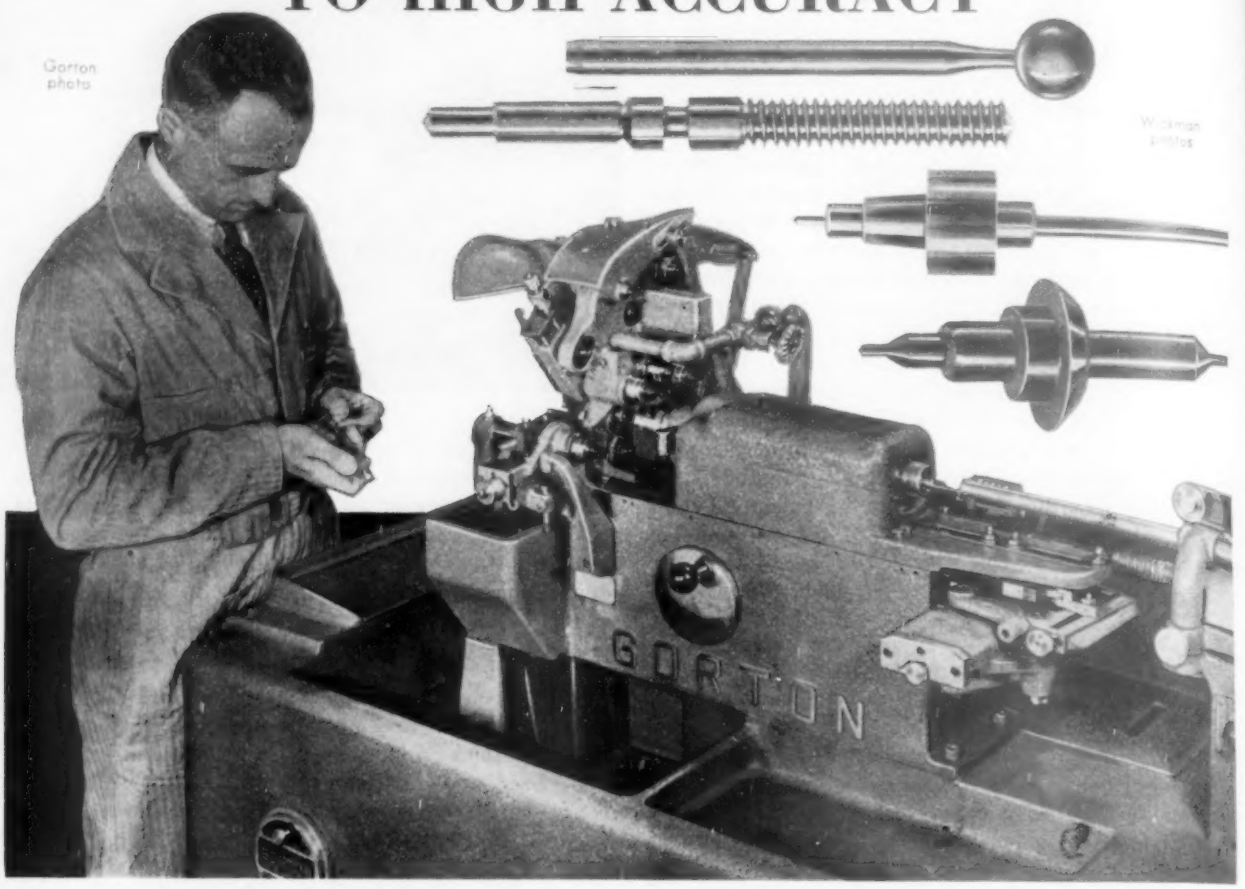
The portable spotwelder consists of a spotweld machine and transformer counter-balanced on a small beam pivoting from an overhead trolley traveling along a 50 foot I beam. The trolley is driven by a sprocket and chain powered by a ⅓ H. P. electric motor. A 200 KVA machine with a welding capacity of two thicknesses of .040 aluminum is used, and the arrangement permits it to operate over a large floor area, with spacers being provided on the I beam to support the drive chain when the apparatus moves from the end of the beam.

Under the new procedure the skin, frames and stiffeners for the doors are all cleaned for spotwelding and assembled in a fixture. They are then tackwelded together with the portable spotwelder and the entire assembly is carried to a floor type spotwelder for completion.

Before the introduction of the portable spotwelder, it was necessary to first assemble the parts in a drill fixture where holes were drilled for skin clamps; then disassemble, clean and burr them for spotwelding, put them together, fasten them with the skin clamps and spotweld them; and finally remove the skin clamps and drive rivets in the holes from which they were taken.



MANUFACTURING SMALL PARTS TO HIGH ACCURACY



Swiss-type automatics, built in America, produce tiny parts — .015" to ½" O.D. — to extreme accuracy and fine finish. Intricate contours, recesses and undercuts, can be machined in a single operation. Form tools are not usually required.

JOHN E. HYLER

CONCURRENT with war-impeded imports, demand for improved design Swiss-type automatic screw machines has caused American manufacturers to build this high production precision equipment. For small diameters, (½" O. D. is upper limit), and especially for very small diameter work that is proportionately long, they are unequalled.

The aircraft instrument industry has found this type of machine advantageous in producing small, slender pinions, shafts and arbors. Dental industries find the machine highly adaptable for producing long, delicate burrs and drills. Manufacturers of small valves use it to turn long stems, where concentricity of seat and stem is essential. Small firearms manufacturers make fuses and small pins on it.

The Swiss-type automatic is not a competitor for conventional screw machine jobs, though it can produce certain pieces in one operation that would call for a second operation on other machines. It turns slender diameters in back of shoulders; it recesses or undercuts either in back of or in front of shoulders; it generates out-of-the-ordinary tapers and curves, and holds dimensions within .0002" or .0003". Diameters as small as .015" are satisfactorily machined.

Basically, the novel action of the Swiss-type automatic consists of sliding headstock motion with in-feed of single point cutting tools. Headstock motion and consecutive movements of the tools are produced and co-ordinated through cam-control from a single shaft. Five-tool machines (there are also some four-tool designs) carry these tools on slides and on a horizontal rocker arm.

COMPARISON WITH STANDARD SINGLE SPINDLE UNITS

THE SWISS-TYPE MACHINE is similar to conventional automatics in that stock is advanced through, and held by, a collet within a hollow spindle. The material is revolved on its axis by the collet, and the cam-actuated slides and rocker arms carry tools to the cut at right angles to the spindle axis. Contrasted to standard machines, the Swiss machine is small, but it is usually arranged on a solid base that provides rigidity and places the machine at a comfortable working height.

The Swiss-type machine has no

turret. The only end-approach tools, ordinarily used for drilling, tapping and threading, are held in special attachments. Form tools are not used in the accepted sense, though it is possible to use small form tools where the work diameter is sufficient to withstand deflection. Their use could only be justified by convenience or as an aid to speeding production in that the machines provide for all kinds of forming with single-point tools.

The headstock is arranged to slide in a direction parallel to the axis of the work. A cam made to suit the particular job advances the headstock against a spring return. There are different methods for transmitting motion between cam and headstock. The objective of each method is to produce various contours by controlling and properly interrelating the forward motion, dwell and retraction of the sliding headstock with the radial advance, dwell and retreat of the tools. If a tool feeds inward at an even rate, and the headstock is simultaneously advanced at an even rate, a taper is produced. Relative rates of motion determine the degree of the taper.

All of the cams used on a Swiss-type automatic are ordinarily located on one camshaft, and the same shaft carries the drum that holds the dogs for tripping the collet-opening and closing mechanism. On some machines, the collet mechanism may be operated several times per cycle, to allow handling of parts longer than maximum feed capacity. With these various adaptations, the collet chuck in the spindle is made to hold the rod, revolve it, and to advance, retract or dwell with it while revolving, as the conditions for any given job may have been incorporated into a given headstock cam.

As the stock is advanced by the sliding headstock, it is thrust through a bushing held in a tool head, positively located in advance of the headstock. This tool head, in addition to supporting the bushing, supports a rocker arm carrying two-tools, tool slides for two or three tools, and composite mechanism for operating the slides.

Tools, radially disposed within in a semi-circular plane around the working face of the bushing, converge toward the work. They usually operate only a few thousandths of an inch from the bushing, and are never removed from the bushing face more than 1/32". With light cuts and feeds, support for the work is adequate. The bushing fits closely to the stock, which is often centerless ground.

The bushing may be of hardened tool steel, or fitted with carbide inserts. Special bronze may be used when machining materials are likely to seize. Where extreme accuracy is not important, a collet-type revolving bushing will compensate for slight out-of-roundness or diametral differences.

CUTTER ACTUATION

All movements of the cam-actuated tools must be inter-related with headstock motion. A common method for actuating the sliding tools is shown in Figure 1, which is a rear view of the tool head on a small machine. Arms, pivoted at one end, carry cam followers at the other end. The pivoted members transmit motion from the cams to offset rocking members through connecting rods. The offset rocking members deliver the necessary motion directly to the tops of the tool-slides. Figure 2, a front view of the tool head, shows all three sliding tools, and the rocker arm which carries the two lower tools.

Toolholders on the two ends of the cam-actuated rocker arm (their po-

FIGURE 1.

Rear view of tool head and top view of spindle shows sliding tool actuation. Pivoted member A rides cam through follower at right. Through connecting rod B, motion is transmitted to rocker arm C, and thus directly to the top of tool slide in front of the tool head. Note micrometer adjustment between the arm C and the toolslide.

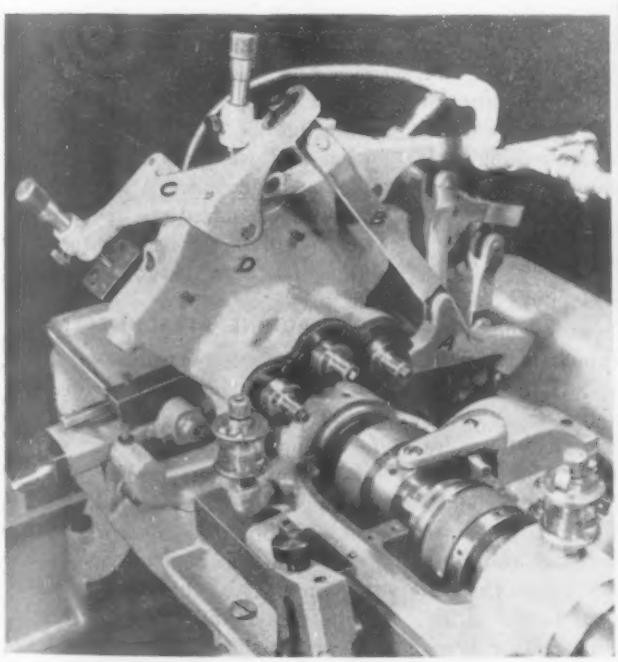
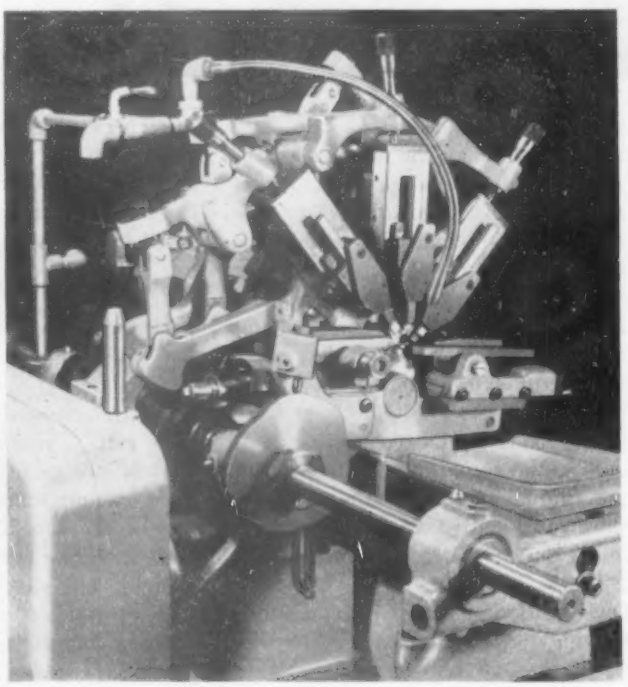


FIGURE 2.

Front view of tool head shows linkage to tool slides, and cam actuation on rocker which operates two lower tools. Tools operate singly, their movement being coordinated with sliding motion of the headstock to produce form.

Wickman photos



sitions correspond to the front and back cross-slides on a standard single spindle automatic) can be adjusted and tightened at the proper angle. Micrometer adjustment screws are provided for moving cutting tools radially and axially. Radial adjustment frequently compensates for minor cam errors.

Approach of the tools to the work is shown in Figure 3, the left hand rocker tool being engaged. The cutter which moves upwards is always the one that enters the cut. Since cutters operate singly, and a spring return is provided for the rocker, only one cam is required.

In straight turning, one of the tools is fed radially into the work, and dwells at the pre-determined depth while the headstock cam feeds the work through the bushing for the pre-determined distance. A rocker tool is usually selected to take the heaviest cuts, and to machine to the greatest accuarcy. The rocker mechanism is so designed that the tool moves only one-third the amount that the cam moves the follower, so that slight error in the cam is divided by three.

Top ends of the connecting rods used in the actuating mechanisms for the sliding tools on the machine shown in Figure 3 are so arranged in a slot that they can be moved to different positions on the rocker arm. One position is used with cams that provide a 3 to 1 motion. Smaller-rise cams are used in conjunction with the less accurate 2 to 1 setup. In some cases, standard cam motions may be modified for work for which they were not designed by setting tools between the marks.

Concern for accuracy is indicated in layout of cams. Instead of dividing a cam into 100 parts, as is done for most layout, it is divided into 360 parts, based on degrees. Layout of cams for a typical job applying to a 4-tool machine is shown in Figure 4.

Some manufacturers of Swiss-type screw machines have developed special equipment for use in camming machines. A special grinder has been developed for flat cams employing a constant rise or fall. A plate is also available for laying out cams by the 360-degree method. A cam layout and checking gage has also proved convenient for laying out dwells, in addition to its use as a checking tool. Curved template plates are also provided for bell cam layouts.

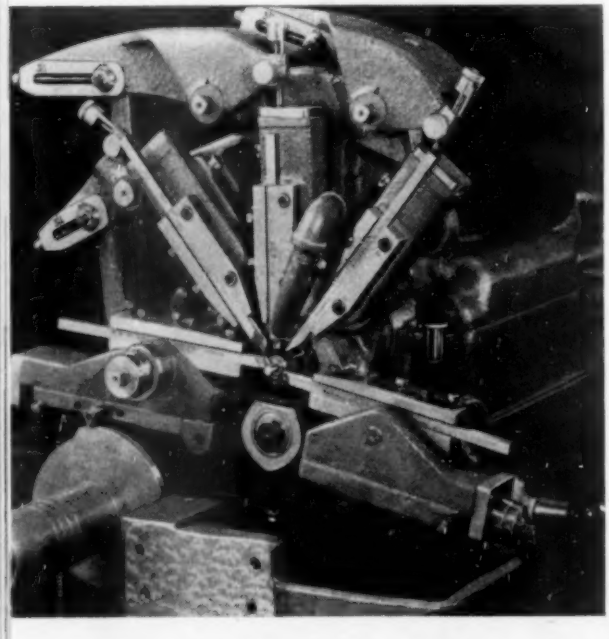


FIGURE 3.

Front view of toolhead shows Tool No. 2 on rocker arm engaging the work. Rise and fall of single cam (with spring return) controls movement of both tools on the rocker arm.

Note slots in actuating mechanism for slide tools, providing 2 to 1 or 3 to 1 ratio between tools and actuating cams.

Gorton photo

CAMSHAFT SPEEDS

BECAUSE MACHINES COVER such a wide range of work and tools advance one at a time, time cycles vary tremendously. Many simple parts can be completed in 5 to 10 seconds, while others may require three or four minutes. One revolution of the camshaft being synonymous with one cycle, provision must be made for varying the camshaft speeds through a wide range. On one machine, camshaft speeds are varied through a gear-box. A feature is an accelerator which speeds up the camshaft for traversing the headstock when tools are inactive, or for opening and closing the collet chuck. On long cycles, from 5 to 50 seconds may be saved by the use of this accelerator. The accelerator by-passes the change gears, transmitting power directly from the constant-speed shaft. As for the headstock spindle, 29 speeds are provided on this machine, ranging from 1129 to 7057 rpm.

VARIABLE SPEED UNITS

VARIABLE SPEED DRIVES, providing stepless speed changes for both the camshaft and the headstock spindle, are an important part of some modern Swiss-type units. Infinite variation from 1100 to 10,000 rpm on the spindle of one machine is provided by a variable speed mechanism.

STOP AND FEED

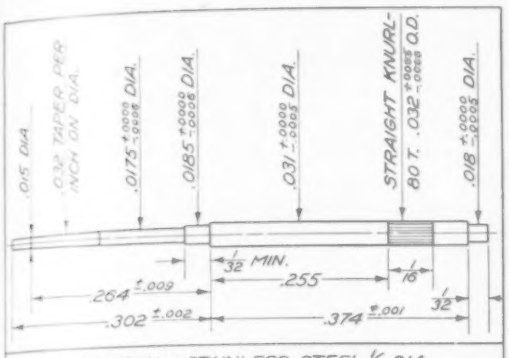
THERE IS NO stock stop on the Swiss-type automatic in the ordinary sense. To gage stock feed, the cut-off tool may dwell at the fed-in position until the headstock is retracted a pre-determined distance. The rod is pushed against the cut-off tool until the retraction takes place, and the collet closes. That is why the first operation in a sequence chart may be noted as "Out 4" or "Out 5", indicating withdrawal of the cut-off tool that has been serving as a stop gage.

To keep the rod thrust against the cut-off tool, a gravity feed is often used as shown in Figure 5. A push finger exerts a continual though moderate thrust against the end of the rod. The finger is actuated by a wire to which it is connected, the wire being one of two which are connected and wrapped around a dual pulley arrangement. A weight maintains the required tension in the wires. A special air feed for the same purpose has been designed.

MACHINE ATTACHMENTS

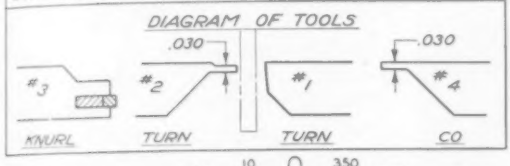
END-WORKING ATTACHMENTS are provided by manufacturers of Swiss-type automatics. Single- spindle drilling attachments and single-spindle threading attachments are available. These are located in alignment with the axis of the work. Three-spindle attachments can be pivoted or trunnioned so that their centers can be rocked into true alignment. Ordinarily, these are arranged for

FIGURE 4. Sequence of operations and cam development required to produce part shown on sequence sheet. Instead of dividing cam layout into 100 parts, 360 degrees are used to attain accuracy. Cam No. 2 actuates Tools 1 and 2 on rocker arm; Cam No. 4 actuates the cut-off tool; and Cam No. 5 controls the motion of the headstock.

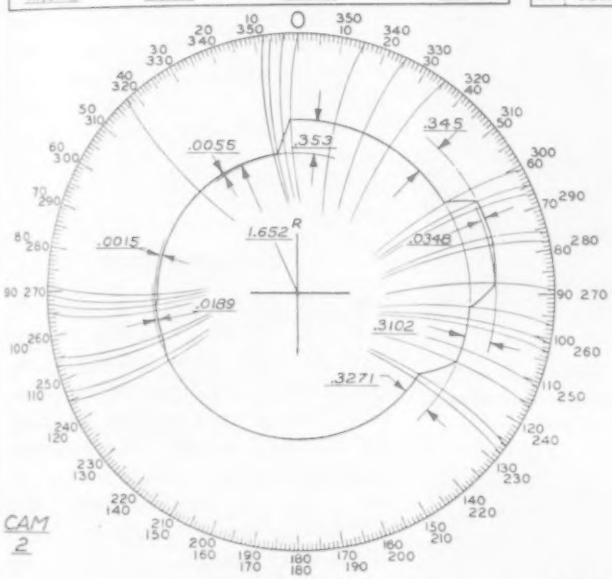


MATERIAL : STAINLESS STEEL 1/16 DIA.

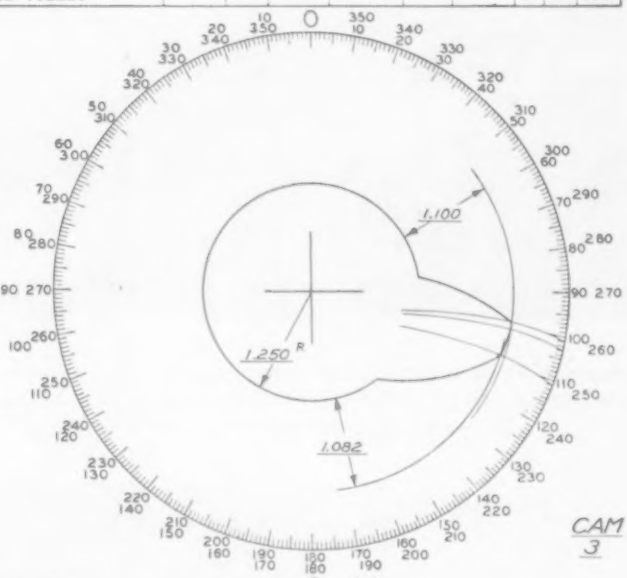
	CALCULATED
SPINDLE RPM	3900
TOTAL REV. FOR ONE PC.	1374
NO. OF SECONDS ONE PC.	21
GROSS PRO. PER. HOUR	170
SURFACE FEET PER. MIN.	65



	SEQUENCE OF OPERATION	FEED	REVOLUTION OF SPINDLE	DIAMETER BEING TURNED	RADIUS AT FINISH OF FALL OR RISE ON No. 2 CAM	LENGTH BEING TURNED	RADIUS AT FINISH OF FALL OR RISE ON No. 5 CAM	UNPRODUCTIVE DEGREES	PRODUCTIVE DEGREES	PROGRESSIVE DEGREES
1	OUT #4							3		3
2	IN #1			.0135	1.652			3		6
3	SAFETY							2		8
4	GENERATE ANGLE #1	.0009	130	.0172	1.6575	.117	2.060		34	42
5	TURN #1	.0009	180			.162	2.222		47	89
6	SAFETY							2		91
7	OUT #1			.0182	1.6590			2		93
8	SAFETY							2		95
9	TURN #1	.0009	38			.033	2.255		10	105
10	SAFETY							2		107
11	OUT #1	.0003	21	.0308	1.6779				6	113
12	SAFETY							2		115
13	TURN #1	.0009	450			.405	2.660		117	232
14	SAFETY							2		234
15	OUT #1			N.	2.005			10		244
16	ADVANCE HEAD IN #3					.090	2.750	5		249
17	KNURL #3	.0003	30	.028					8	257
18	SAFETY							2		259
19	OUT #3							4		263
20	RECOIL HEAD IN #2			.041	2.3152	.101	2.649	8		271
21	IN #2	.0003	39	.0178	2.350				11	282
22	SAFETY							2		284
23	TURN #2	.0009	35			.031	2.680		9	293
24	SAFETY							2		295
25	OUT #2 -- IN #4			N.	2.005			4		299
26	CO #4	.0003	100						26	325
27	OPEN COLLET							10		335
28	RECOIL HEAD						1.943	10		345
29	CLOSE COLLET							15		360

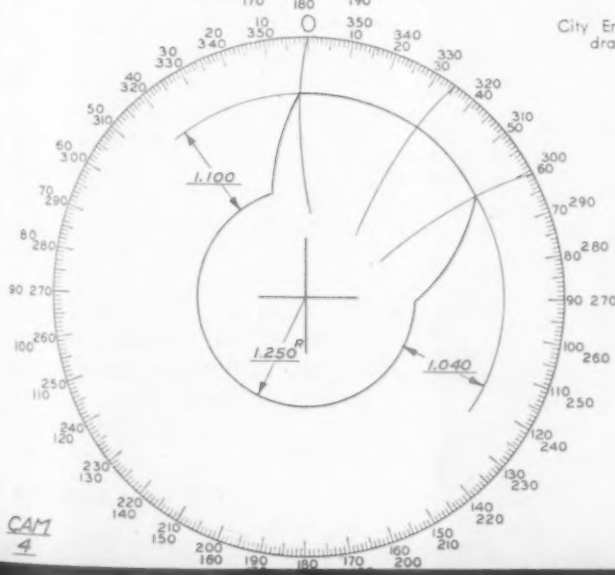


CAM 2



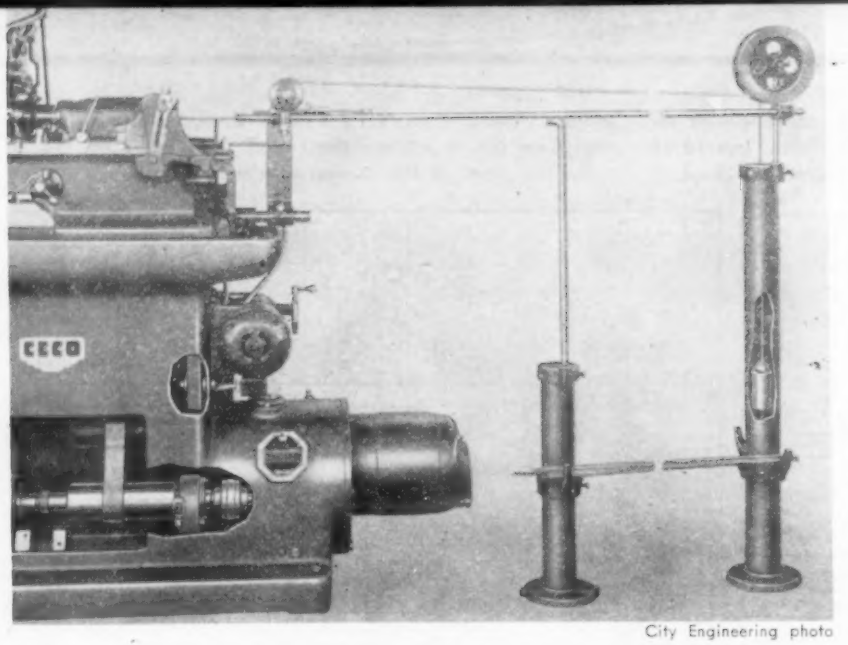
CAM 3

City Engineering drawings



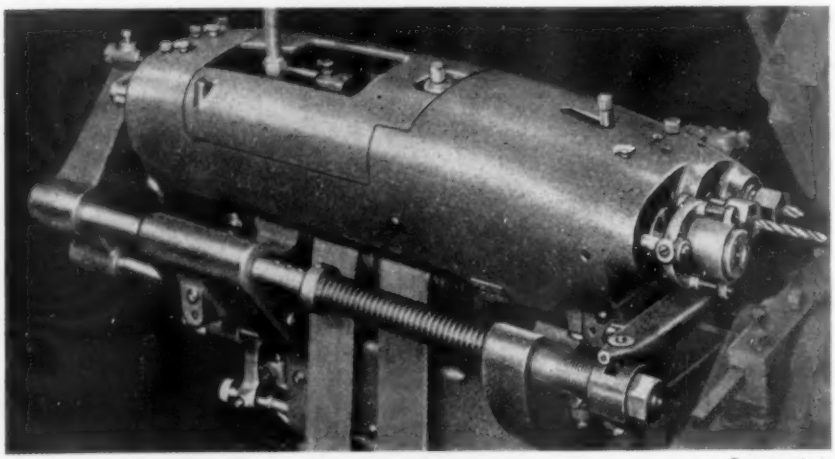
CAM 4

CAM 5



City Engineering photo

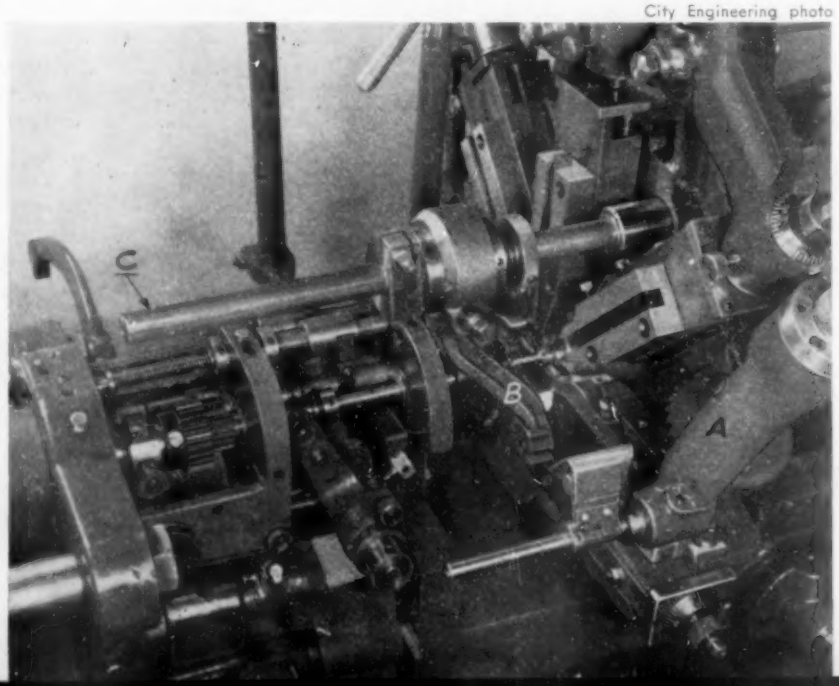
FIGURE 5. Partial side-view of Swiss-type unit shows gravity feed used to hold stock against cut-off tool when headstock is retracted. This prevents stock from withdrawing, and permits gaging stock feed.



Gorton photo

Above: **FIGURE 6.** Three spindle attachment for center-spotting, drilling, threading, and tapping. ***Below:*** **FIGURE 7.** Slotting saw attachment can be seen behind arm A. Pick-up arm B, swinging from C, carries work to slotting saw.

City Engineering photo



spot centering, drilling and tapping or threading, though they are adaptable for other work requirements which are seldom encountered if proper tooling is applied.

Figure 6 shows a three-spindle attachment. The threading and tapping operations are designed to operate on the speed-differential principle. Swiss-type automatics do not provide a reverse work spindle rotation. A non-expanding die rotates with the work, but turns as many as 2000 rpm faster while cutting. No lead screw is employed, the tap or die following its own lead. When the required length thread has been cut, die speed is reduced to around 2000 rpm less than the work. Where the drive is taken from the main shaft, it may be made independent of the speed of that shaft by using variable-pitch pulleys.

Occasionally, Swiss-type automatics are fitted with a slotting or light milling attachment. On one machine, the slotting saw arbor is located at the side, out of alignment with the spindle. It may be adjusted longitudinally by a micrometer screw. A pick-up arm swinging from a shaft above the spindle, takes the parts as they are cut-off, and transfers them to the slotting attachment. The attachment is driven from the main shaft. Figure 7 shows the saw and pick-up arm.

CHIP SEPARATOR

An accessory has been developed for Swiss-type automatics to separate chips from finished parts. On sizeable parts, up to ½″ diameter and 1″ long, this machine separates by blowing action. The machine plugs into a light socket, and can be set on any convenient bench or table. Fed into a hopper, parts and chips are pushed through a 1″ by 3″ slot in the bottom. Dropping into a vibrator, they are spread out, and chips are blown through a hood, while parts are delivered through a side chute.

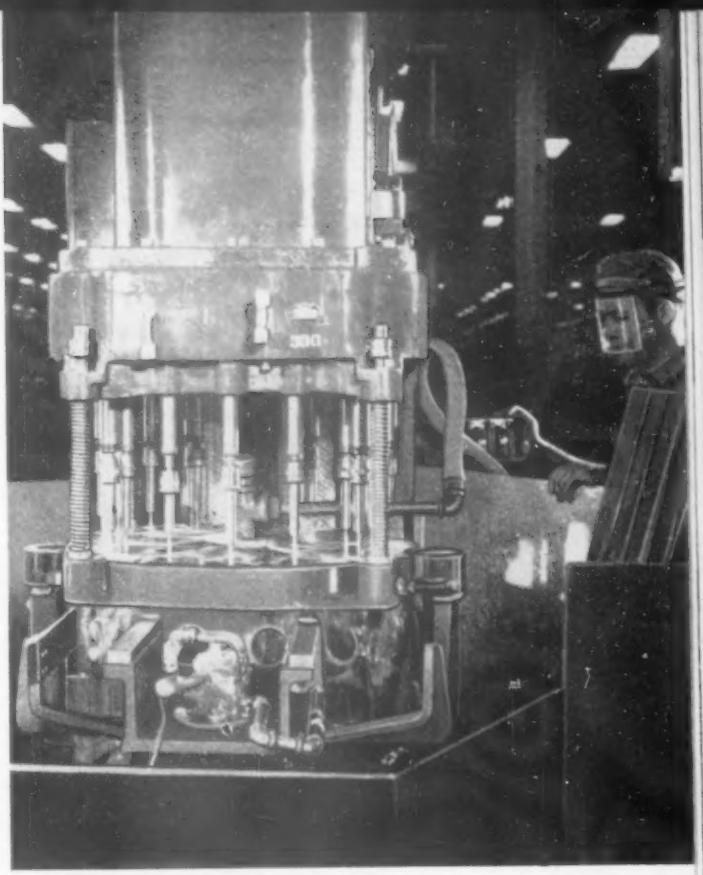
Because tiny parts would be blown out if handled in the same manner, an attachment has been provided which utilizes the suction of the fan. An extension sets over the front of the fan, and as material is fed into a hopper at the top of the attachment, chips are sucked through the fan, while parts drop into a drawer in the bottom of the attachment. A lever regulates the blast, either for blowing or exhausting. The End

Machining Magnesium

Recommended Methods for 10 Operations

PART TWO: Though magnesium is one of the easiest metals to machine, proper speeds, feeds and selection of tools will improve results. Here are approved recommendations for various common machining operations

A. M. LENNIE
MAGNESIUM DIVISION
THE DOW CHEMICAL COMPANY



Dow Chemical photo and drawings
Drilling speeds up to 2,000 feet per minute are being used successfully on magnesium.

NOT ONLY because it is known as the world's lightest structural metal, but because of its unusual and excellent machining characteristics, magnesium may be expected to assume an increasingly important role in peacetime manufacture.

So easily cut that its low machining costs frequently outweigh its higher base price, magnesium and its alloys generally can be turned at the maximum speeds obtainable on modern machine tools.

Lathe setups, with due consideration to the more careful chucking, required with magnesium and slight differences in tool design, are similar to those used for brass or steel. It is important in all types of lathe tools that the relief angles be sufficiently large to eliminate rubbing of the tool flanks.

VARIOUS RAKE ANGLES SUITABLE

Rake angles may vary considerably, but best results are usually obtained on high-speed steel tools with side and back rake angles of 0° to 15°.

Carbide tipped tools, however, should have slightly smaller rake angles in order to provide more support for the cutting edge. Forming tools usually have the back rake angle reduced to approximately 0° to 8° to eliminate chatter. Side and end cutting edge angles may be varied widely to suit the particular job, but side cutting edge angles above approximately 40° may cause chatter. Nose radii should be kept small to avoid rubbing.

A wide range of cutting speeds, feeds, and depths of cut are possible in turning and boring this metal. Depths of cut as high as .500″, and feeds from .003″ to .200″ are being used commercially. The depth of cut, of course, is dependent upon the amount of stock to be removed, but for all practical purposes any depth of cut can be taken, provided the work is of sufficient size and is properly chucked.

Heavy feeds enable fast removal of metal, but do not give the best surface finish. For good finish, tool feeds should not exceed approximately .025″.

Extremely fine cuts should be avoided wherever possible inasmuch as they tend to heat the work more than heavier cuts. The cutting speeds for magnesium vary from approximately 150 to 5000 feet per minute. Selection of the cutting speed will depend upon many factors, but in most cases the allowable speed exceeds the maximum speed of the machine tool. Table A presents general recommendations for determining depths of cut, feeds, and cutting speeds for magnesium. The general rule is to turn and bore magnesium as fast as the machine tool, fixtures, and work will allow.

Practically the same tool designs and machining recommendations as outlined for turning and boring can be applied to the shaping and planing. When necessary, deviations from the recommended tool shapes can be made as long as sharp cutting edges and proper relief angles are used.

HEAVY FEEDS AND MAXIMUM CUTS

Inasmuch as the maximum cutting speeds in these operations are much lower than the recommended cutting speeds, economies in operation are usually effected through use of heavy feeds and depth of cut which are made possible by the low power required to machine magnesium. The rigidity of the work piece and clamping fixtures as well as the possibility of inducing machining stresses in the work are the limiting factors in the maximum possible size of cut.

To prevent marring the surface on finish cuts, the tool block should be lifted on the return stroke of the ram to

TABLE A. Recommended Speeds, Feeds, and Depths of Cut for Turning and Boring Magnesium.

OPERATION	SPEED *fpm*	FEED *ipm*	MAXIMUM Depth of Cut *inches*
ROUGHING	300 TO 600	0.030 TO 0.100	0.500
	600 TO 1000	0.020 TO 0.080	0.400
	1000 TO 1500	0.010 TO 0.060	0.300
	1500 TO 2000	0.010 TO 0.040	0.200
	2000 TO 5000	0.010 TO 0.030	0.150
FINISHING	300 TO 600	0.005 TO 0.025	0.100
	600 TO 1000	0.005 TO 0.020	0.080
	1000 TO 1500	0.003 TO 0.015	0.050
	1500 TO 2000	0.003 TO 0.015	0.050
	2000 TO 5000	0.003 TO 0.015	0.050

TABLE B. Recommended Speeds, Feeds, and Depths of Cut for Milling Magnesium.

	SPEED *fpm*	FEED *in./min.*	FEED *in./tooth*	DEPTH OF CUT *inches*
ROUGHING	UP TO 900	10 TO 50	0.005 TO 0.025	UP TO 0.500
	900 TO 1500	10 TO 60	0.005 TO 0.020	UP TO 0.375
	1500 TO 3000	15 TO 75	0.005 TO 0.010	UP TO 0.200
FINISHING	UP TO 900	10 TO 50	0.005 TO 0.015	UP TO 0.075
	1000 TO 3000	10 TO 70	0.004 TO 0.008	0.005 TO 0.050
	3000 TO 5000	10 TO 90	0.003 TO 0.006	0.003 TO 0.030
	5000 TO 9000	10 TO 120	0.002 TO 0.005	0.003 TO 0.030

TABLE C. Recommended Feeds and Speeds for Drilling

DRILL DIA.	SPEED *fpm*	FEED *ipr*		
		SHEET	SHALLOW HOLES	DEEP HOLES
½ INCH	300	0.005 TO 0.030	0.004 TO 0.030	0.004 TO 0.008
¼ INCH	TO	0.010 TO 0.030	0.015 TO 0.040	0.012 TO 0.020
1 INCH	2000	0.010 TO 0.030	0.020 TO 0.050	0.015 TO 0.030

avoid dragging the tool over the work surface.

Milling operations provide an opportunity to take full advantage of the metal's excellent machining characteristics. Heavy feeds and extremely high milling speeds can be used to remove metal rapidly with excellent surface finish.

High-speed steel can be used satisfactorily on all types of milling cutters, but cemented carbides are superior for inserted tooth face mills and fly cutters which operate at high speeds. Slab, side cutting, and straddle mills should be coarse toothed with one-half to one-third as many teeth as in mills for steel.

Inserted blade face mills should have very large chip spaces to provide for ready removal of the large volume of chips produced. Single and multiple tooth fly cutters perform very well on magnesium alloys.

Negative face rake angles are sometimes used on face mills to throw the chips out of the cutter. Helical slab mills should have a helix angle of approximately 45°.

Cutting speeds up to 9000 feet per minute are being used in milling magnesium alloys. These extremely high speeds emphasize the possible reduction in machining time which can be effected through the use of magnesium. Table B indicates the approximate speeds, feeds and depth of cut to be used in milling operations.

A wide variety of feeds and depths of cut are possible; therefore only general recommendations based on industrial experience can be made. The full depth of cut can usually be taken in one pass, but for finish cuts the depth should not be less than .003″ to .004″. Heating of the work can be minimized by heavy roughing cuts followed by fine finish cuts at maximum speed. Mirror-like finishes can be obtained on milled magnesium surfaces.

Best results are obtained in drilling magnesium if the drills are correctly designed for the type of drilling being performed. Three types of drills will effectively service all drilling operations. These types of drills include drills for sheet metal, shallow holes (depth less than five times the drill diameter), and deep holes.

● SHEET DRILLS: Magnesium sheet can be drilled with a sharp, standard 118° point angle drill, but for high production of accurate holed with a good finish and a minimum burr, a slightly modified drill should be used.

The point angle should be reduced to approximately 60° to prevent "walking" of the drill, to reduce thrust, and to prevent abrupt change of thrust when breaking through. The chisel edge angle should be within the range of 120° to 135°. The web should be thinned and the ends of the cutting edges rounded. A thin web at the point helps to center the drill and reduce thrust, while the rounded corners provide a smooth finish and reduce burrs. A helix angle of approximately 10° will prevent work from climbing the drill on the break-through. Figure 1 illustrates a drill recommended for sheet.

● SHALLOW-HOLE DRILLS: Drilling holes to a depth of less than five times the drill diameter presents few difficulties. Consequently, only a few drill modifications are necessary to secure maximum production of high quality holes.

The standard helix angle of approximately 25° is satisfactory, but may vary from 10° to 30°. Highly polished flutes are recommended to facilitate the flow of chips out of the hole, especially if low helix angle drills are used. Standard-point angles of 118° and chisel edge angles of 120° to 135° which give a relief angle of approximately 12° will give the best cutting action. Point angles may be reduced to as low as 70° and spur points can be added to eliminate any spiralling in the drilled hole.

Rounded corners will give accurately sized holes and better surface finish. It is extremely important, no matter what type drill is used, that the cutting edges be kept sharp. Dull drills will give poor surface finish, undersized holes, burrs, and will tend to heat up the work. A typical drill for shallow holes is shown in Figure 2.

● DEEP-HOLE DRILLS: The excellent machining characteristics of magnesium permit the drilling of very deep holes with speed and precision. Certain types of drills must be used to obtain satisfactory results in deep-hole.

Drilling deep holes produces an appreciable quantity of chips which must be guided out of the hold through a considerable length of drill flute. High-helix drills (40° to 45°) will do this satisfactorily. Flutes should be opened and polished to provide larger chip spaces and smooth surfaces to aid in chip removal. The web of the drill

should have a constant thickness for its entire length to provide large flutes at the top and bottom of the drill.

Low helix angle drills or drills with unopened flutes may cause chips to jam, resulting in high torques and poor surface finish. Drills of this latter type will have to be withdrawn frequently to clear the flutes, whereas a high-helix drill can penetrate to 25 times the drill diameter in a single pass.

Chisel edge angles of 135° to 150° are essential to provide good surface finish and minimize spiralling in the hole. Angles smaller or larger than those recommended cause difficulties due to improper relief at the cutting edge and the lack of proper centering of the drill. The standard drill point angle of 118° has been found to be the most satisfactory. A spur or pilot point ground at the center of the drill will reduce spiralling or "run-off". It is good practice to use this spur point drill for all deep hole drilling to insure straight, smooth holes.

A spur point drill with a 45° helix angle is illustrated in Figure 3. The fact that this type drill can be used to produce holes up to 25 times the drill diameter without withdrawing the drill to clear the flutes is of particular importance in the use of multiple spindle or automatic drilling machines. Special drills such as oil hole or rifle drills which employ high pressure oil to clear the flutes of chips may also be used to drill deep holes if light feeds are employed.

Drill jig bushings should clear the work by a minimum of 1½ times the drill diameter to reduce the effective depth of holes. Extreme care should be taken to avoid chipping or nicking of drills in the bushings, inasmuch as dull or nicked tools will not work satisfactorily.

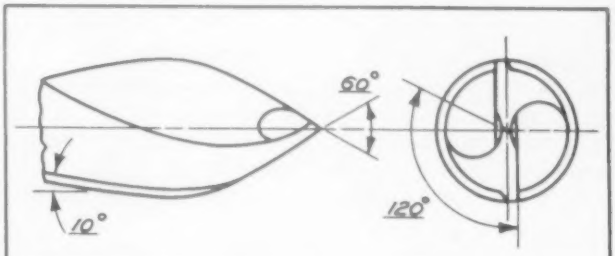
● Drilling Speeds and Feeds: The maximum speeds obtainable on drilling equipment can be used for magnesium alloys. The speeds used in commercial shops are in the range of 75 to 400 feet per minute, but speeds up to 2000 feet per minute can be used on magnesium. In addition to the decrease in machining time made possible by the use of these high cutting speeds, a material improvement in surface finish, and accuracy of the drilled holes is obtained.

The feeds used in drilling magnesium should be heavier than those for other metals in order to secure proper chip formation. Small drills work best with light feeds, as they give slightly coiled or ribbon-like chips which feed out through the drill flutes without jamming. Heavier feeds on large drills prevent jamming of the chips.

Table C lists the approximate feeds to be used with various diameter drills. Chips formed at these feeds have a minimum bulk and are removed easily even from very deep holes. Wide deviations from the recommended feeds are allowable when drilling shallow holes, but the recommendations for deep hole drilling should be closely followed for best results.

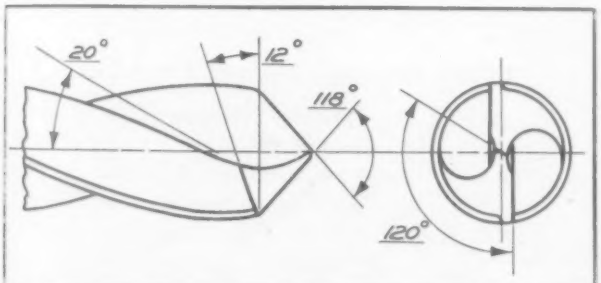
Reamers for magnesium alloys should have fewer flutes than normal for best results. Reamers under approximately one inch in diameter should have four flutes, while those over one inch in diameter should have six flutes.

FIGURE 2. Shallow hole drill data.



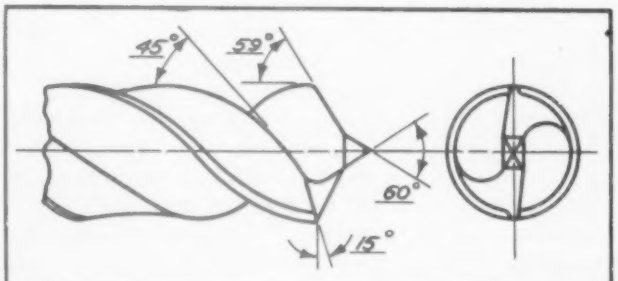
DRILL ELEMENT	RECOMMENDATION
POINT ANGLE	60°
HELIX ANGLE	10°
CHISEL EDGE ANGLE	120 TO 135°
WEB	THINNED AT POINT
CORNERS	ROUNDED

FIGURE 1. Sheet drill data.

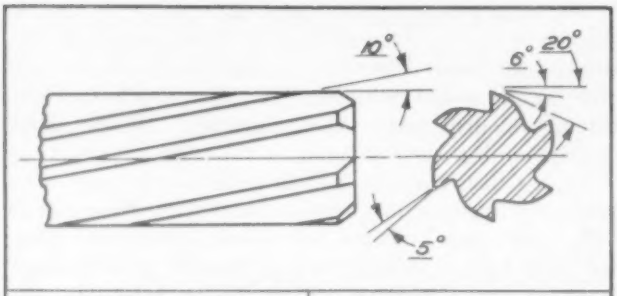


DRILL ELEMENT	RECOMMENDATION
POINT ANGLE	70 TO 118°
HELIX ANGLE	10 TO 30°
CHISEL EDGE ANGLE	120 TO 135°
RELIEF ANGLE	12°
CORNERS	ROUNDED
FLUTES	POLISHED

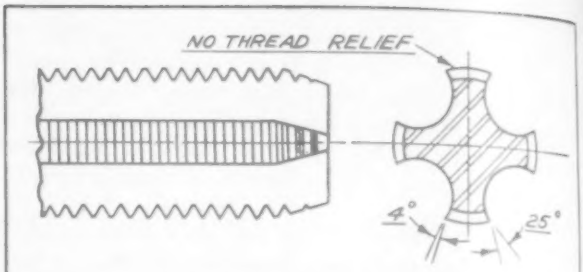
FIGURE 3. Deep hole drill data.



DRILL ELEMENT	RECOMMENDATION
POINT ANGLE	118°
HELIX ANGLE	40 TO 45°
CHISEL EDGE ANGLE	135 TO 150°
WEB	CONSTANT THICKNESS
FLUTES	OPEN AND POLISHED
POINT	118° PLUS SPUR



REAMER ELEMENT	RECOMMENDATION
HELIX ANGLE	0°(STRAIGHT) OR 10°
RAKE ANGLE	5 TO 8°
RELIEF ANGLE	4 TO 7°
CLEARANCE ANGLE	15 TO 20°
MARGIN	0.010 TO 0.025"
FLUTES	4 TO 6°



TAP ELEMENT	RECOMMENDATION
RAKE ANGLE	10 TO 25°
HEEL RAKE ANGLE	3 TO 5°
CHAMFER	2 TO 3 THREADS
LANDS	CYLINDRICAL & NARROW
FLUTES	2 TO 4

Left: FIGURE 4, reamer; above: FIGURE 5, typical tap, recommended for use on magnesium.

The flutes may be straight (0° helix angle) or have a negative helix angle of approximately 10°. The recommendations for the dimensions of reamers for magnesium are shown in Figure 4.

Margins should be narrow to minimize springing of the metal and to obtain accurately sized reamed holes. In some cases no margins are used to secure a free cutting reamer. Reaming feeds used for brass and steel will work satisfactorily on magnesium, but a wide range of feeds can be used. A definite cut should be taken with the reamer, otherwise the metal will compress, resulting in an under-sized hole with poor surface finish. Approximately 1/32" on a diameter should be sufficient stock for reaming holes in magnesium alloys. Heavier cuts may result in chips jamming in the flutes with resultant damage to surface finish and possibly in under-sized holes.

RECOMMENDED CUTTING SPEEDS FOR HOLES

Cutting speeds commonly used in commercial practice vary from 100 to 400 feet per minute, with the maximum cutting speeds being established by the maximum speed of the machine tools. High cutting speeds and medium feeds give the best finish and most accurate holes.

Threads which are not held to extremely close tolerances may be tapped in magnesium alloys with standard taps. High production and the close tolerances necessary for class 3 and 4 threads require the use of taps which are designed for use on magnesium. The taps recommended are the ground high speed steel, straight or helical fluted concentric type shown in Figure 5.

The use of a heel rake and elimination of radial thread relief provide a cutting action on backing out which prevents jamming of the chips and provides a clean, accurately tapped hole. If a tendency is observed for a tap to cut oversize, the rake angle should be decreased; conversely, increasing the rake angle will make a tap cut larger. Dull taps will cut undersize as well as give poor surface finish.

Cylindrical lands narrower than normal should be used. Two-fluted taps are recommended for holes up to 1/2" diameter, 3 fluted holes from 1/2" to approximately 3/4", and four fluted for larger holes.

Gun taps, interrupted thread taps and other special types can be used with success on certain jobs, but for all general purposes the tap design outlined above will suffice. Tapping speeds from 75 to 200 feet per minute are recommended.

Standard tapping heads and tapping machines work satisfactorily on magnesium alloys, but experience has shown that machines utilizing a lead screw to establish the pitch of the threads produce more accurate threads than any other type of tapping equipment. Errors in lead and poor surface finish are caused by inadvertently forcing the tap, which in the relatively soft magnesium prevents the tap from accurately following its own lead.

The use of a mineral oil cutting fluid will facilitate the tapping of magnesium. Any cutting fluids within the range of physical properties recommended in last month's TOOL ENGINEER article on machining magnesium will work satisfactorily.

Threading dies should have approximately the same cutting angle as taps. The lands should be as narrow as possible to provide adequate chip clearance.

THREAD CHASING IN MAGNESIUM ALLOYS

Self-opening dies will give threads with maximum smoothness. The cutting angles of thread chasers should approach those used on turning tools with the exception that the rake angle should be somewhat larger. Particular attention should be paid to the sharpness of the cutting edges and the relief angles. Threads may be chased in magnesium alloys at speeds up to 1000 feet per minute.

High-speed steel or cemented carbide counterbores for use on magnesium are ground similar to end mills. Margins should be small with adequate relief and clearance angles to eliminate rubbing and provide adequate chip space.

Sharp interior corners which cause stress concentration must be avoided when machining magnesium. For this reason counterbores should have rounded corners at ends of cutting edges. Corner radii of 1/16" or more are recommended depending upon the diameter of the cutter.

THE END

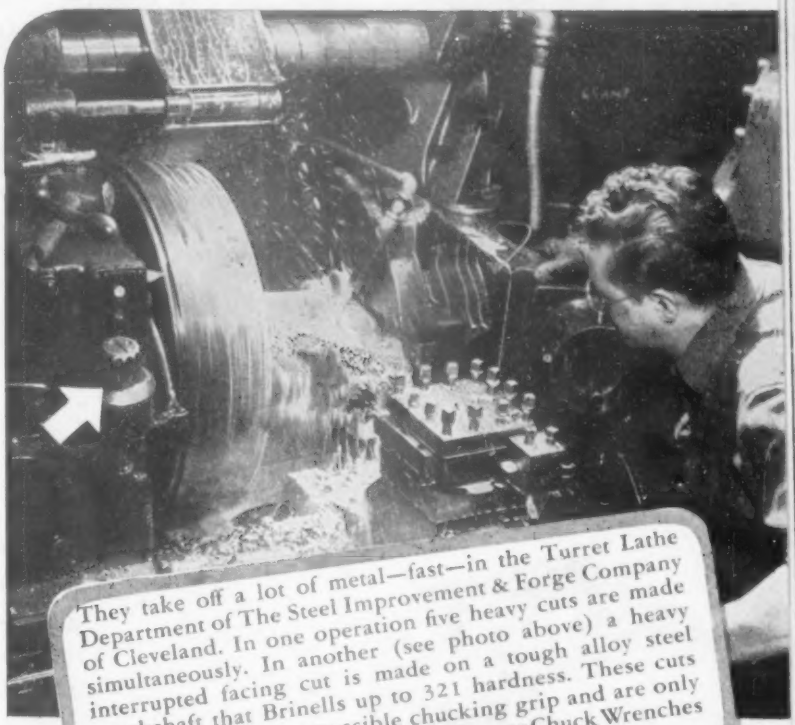
Operator fatigue hurts war production — *eliminate it!*

HAND chucking is hard manual labor and chucking takes time, wears down the operator and decreases efficiency.

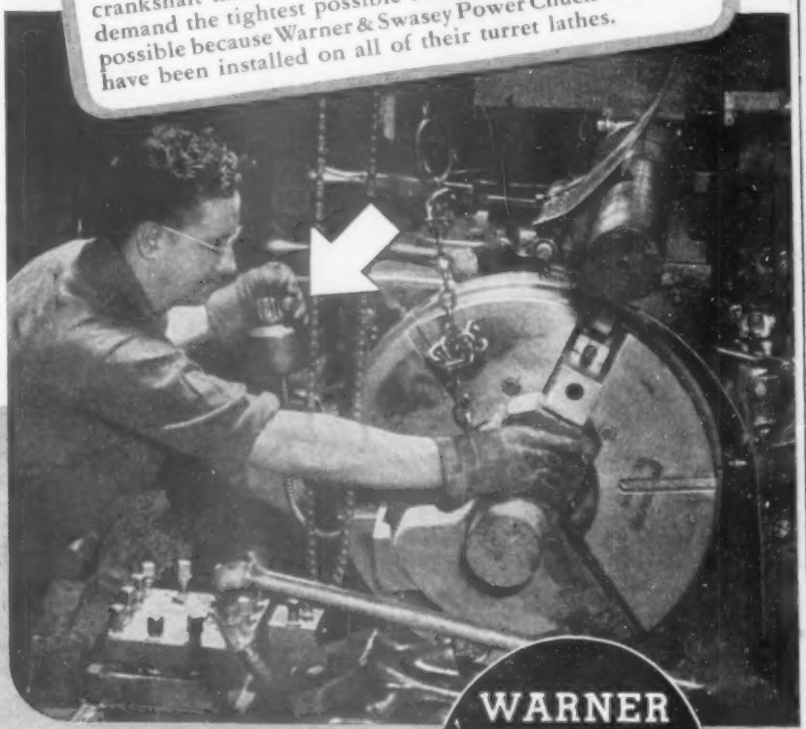
Warner & Swasey Power Chuck Wrenches have licked the problem of operator fatigue and, consequent production sag. With a Warner & Swasey Power Chuck Wrench the operator can grip the heaviest job with no more effort than it takes to turn a door-knob. Heavy work can be held much tighter than with a hand wrench—light, thin-wall jobs can be held with a uniform light pressure to eliminate distortion.

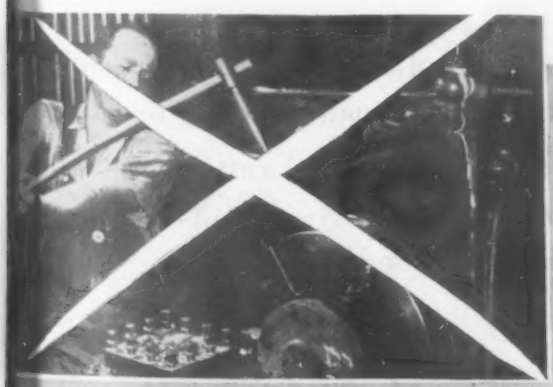
Warner & Swasey Power Chuck Wrenches Can Be Installed on Your *Current Model* Turret Lathes

If you are taking heavy cuts and chucking pieces by manual strength, multiplied by a pipe extension on the chuck wrench, better find out quickly what a Warner & Swasey Power Chuck Wrench can do for you—in faster production, less scrap loss, and better satisfied operators. See your Warner & Swasey field representative or write Warner & Swasey, Cleveland, Ohio.



They take off a lot of metal—fast—in the Turret Lathe Department of The Steel Improvement & Forge Company of Cleveland. In one operation five heavy cuts are made simultaneously. In another (see photo above) a heavy interrupted facing cut is made on a tough alloy steel crankshaft that Brinells up to 321 hardness. These cuts demand the tightest possible chucking grip and are only possible because Warner & Swasey Power Chuck Wrenches have been installed on all of their turret lathes.

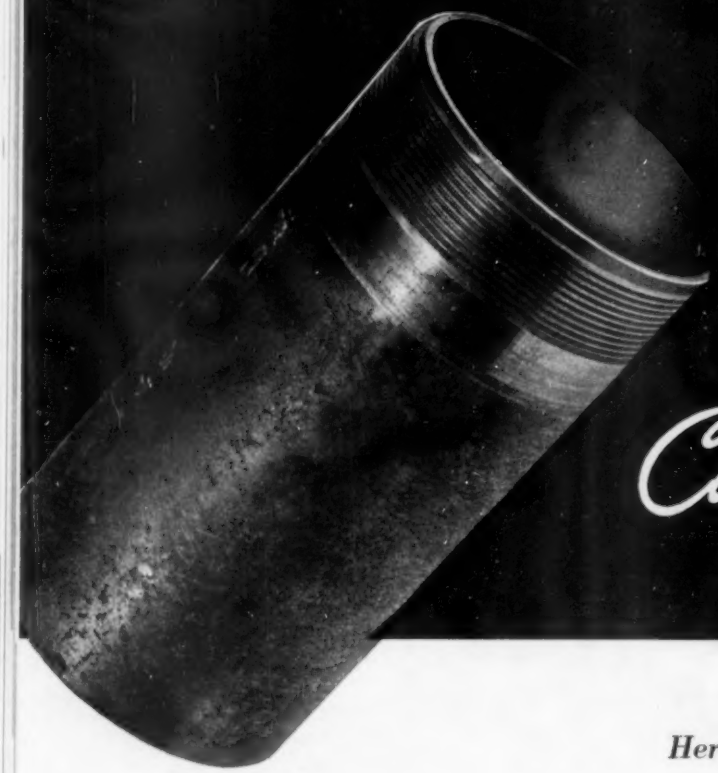




YOU CAN MACHINE IT BETTER, FASTER, FOR LESS . . . WITH A WARNER & SWASEY

WARNER & SWASEY Cleveland

TURRET LATHES, SADDLE AND RAM TYPES • CHUCKING AND BAR TOOLS • PRECISION TAPPING AND THREADING MACHINES



How a Double Duty Tool

Cuts time in HALF

Here was the problem:

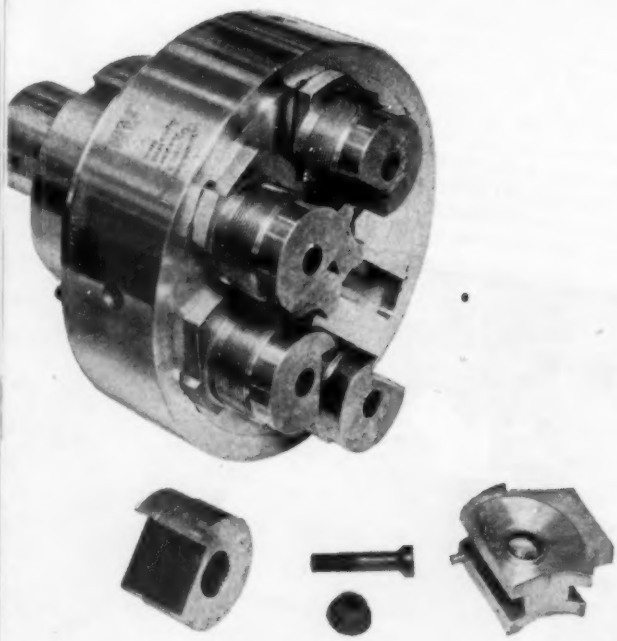
> 3¼" seamless steel tubing to be threaded with a turned section at both ends of the thread—gauge-type, pressure tight thread, with a high degree of concentricity over both turned sections and the thread.

The job formerly required two cuts, with concentricity difficult to attain and there was plenty of scrapped work.

Using a Standard DR 4⅞" Namco Diehead with six special combination threading and hollow mill chasers, all the operations were done at one pass.

Both man time and machine time were cut in half. Spoiled work was reduced to practically nothing, and concentricity was maintained automatically.

This is a typical instance of cutting production costs—and improving quality—with Namco Ground Thread Circular Chaser Dieheads.



New Catalog D-42B brings you complete data on Namco Circular Chaser Dieheads, and shows you how to save time and money on long-run precision threading and hollow mill work.

THE NATIONAL ACME CO

170 EAST 131ST STREET • CLEVELAND, OHIO

ACME-GRIDLEY 4-6 AND 8 SPINDLE BAR AND CHUCKING AUTOMATICS • SINGLE SPINDLE AUTOMATICS • AUTOMATIC THREADING DIES AND TAPS • THE CHRONOLOG • LIMIT AND CONTROL STATION SWITCHES • SOLENOIDS • CENTRIFUGES • CONTRACT MANUFACTURING

PRODUCTION DATA SHEET

DESIGN OF RELIEVED LOCATING PINS

OTTO ENGELHARD

THE RELIEVED LOCATING PIN is commonly used in tool design. Figure 1 shows the function of a relieved locating pin. It locates piece part P on its axis B-B, but permits a slight movement in direction A-A.

There are two designs for relieved locating pins. The pin shown in Figure 2 is easier and cheaper to produce, requiring only two grinding operations. But it is weaker than the pin shown in Figure 3, known as the "Diamond Pin."

Many tool designers calculate the dimension W from ¼ to ⅓ of dimension D, which is satisfactory in most cases. However, there is a definite relationship between total tolerance of pin in hole of piece part (difference between D_2 and D_1 as shown in Figure 4) and dimensions W, T, and B. The phantom line indicates the corresponding relieved locating pin of the style shown in Figure 2.

The side movement of the piece part which the relieved pin allows in direction A-A, indicated in Figure 1, is represented by T. If D_1 and D_2 are given and the maximum sidewise movement T is known, the dimension W is found by using the following formula:

$$W = \frac{D_2^2 - D_1^2 - 4T^2}{4T}$$

From the above, it can be seen that W increases as T decreases, and if the total tolerance between pin and hole (D_2—D_1) is increased, W is also increased. In other words, by increasing the tolerance of pin (D_2—D_1) and decreasing the sidewise movement T, W is increased and a stronger pin results.

$$B\ \text{Maximum} = D_2 - 2T$$

If the pin is moved in the hole to the left (as indicated by arrow A in Figure 4), it will be found that points X and Y of the pin strike the circumference of the D_2 hole at the same time, because S equals T if B equals B Maximum.

Thus it is seen that the above formula provides a maximum thickness for dimension B, and makes full use of the available side tolerance T.

EXAMPLE:

$D_2 = .250$
$D_1 = .248$
$T = .002$

$$W = \frac{.250^2 - .248^2 - 4 \times .002^2}{4 \times .002}$$

$$W = \frac{.062500 - .061504 - 4 \times .00004}{.008}$$

$$= .125$$

$$B\text{max} = .250 - 2 \times .002 = .246$$

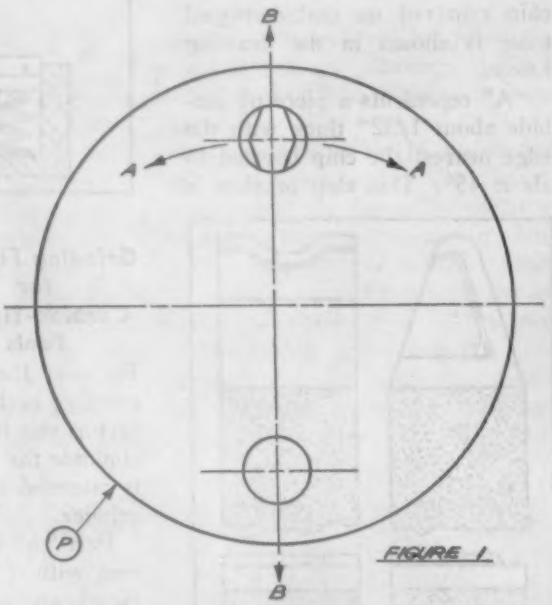


FIGURE 1

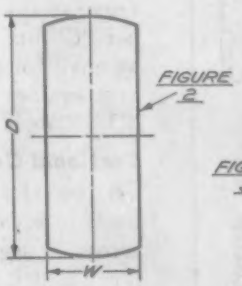


FIGURE 2

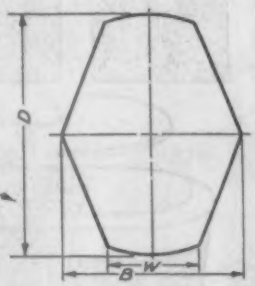


FIGURE 3

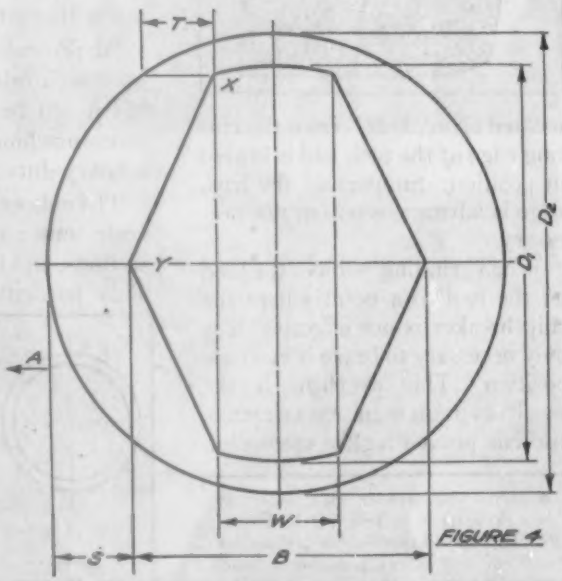


FIGURE 4

NOTE: This is the thirty-fourth of a series of Data Sheets to be published in THE TOOL ENGINEER. A handy three ring binder can be secured at any dime store to hold the sheets for quick reference.

THE CRIB

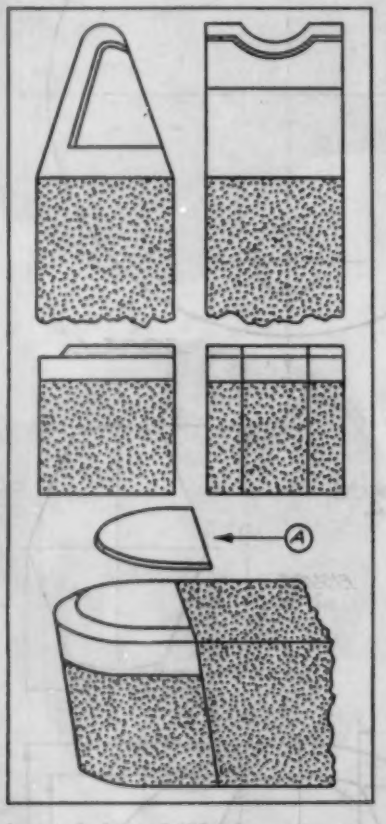
T.M. REG. BY THE BRAMSON PUBLISHING COMPANY

IDEAS - KINKS - SHORT CUTS

Chip Breaker for Carbide-Tipped Tools

A SIMPLE, effective method of chip control on carbide-tipped tools is shown in the drawing below.

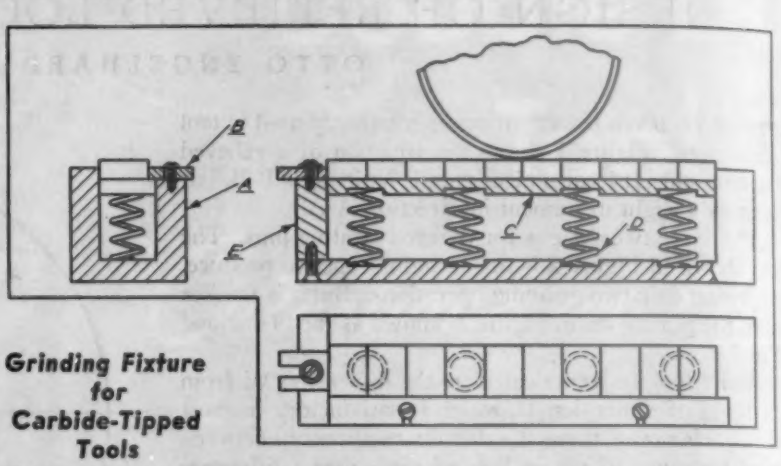
"A" represents a piece of carbide about 1/32" thick with the edge nearest the chip beveled to about 45°. This chip breaker is



located about 3/32" from the cutting edge of the tool, and is brazed in position. Support of the back edge is advantageous but not necessary.

When grinding reduces the land on the tool to a point where the chip breaker is not effective, it is only necessary to braze it in a new position. This method is the result of numerous experiments, and has proved highly successful.

● When you have an idea, short cut or kink, send it to THE TOOL ENGINEER. You will receive five dollars for each of your ideas published. Send your time-and-material savers to The Bramson Publishing Company, 2842 W. Grand Boulevard, Detroit 2, Mich.



Grinding Fixture for Carbide-Tipped Tools

BECAUSE the pressure exerted in grinding carbide tools is a critical factor, this fixture is designed to elminate the skill requirement. It is intended for use on a surface grinder.

Part "A" is a block of steel or iron with a slot (shown in end view), and a step for a series of finger straps "B". A sliding member "C" fits into slot and acts as an anvil for the carbide tips. It is kept against the stops by springs "D". Plate is counterbored on bottom face to hold springs which should be strong enough to withstand the wheel pressure, but weak enough to compress under strong pressure.

End pieces "E" are held in position with screws and have a finger clamp to take end pressure of the tips. The drawing above shows one strap on edge, but if there is a variation in the width of the carbide tips, it may be necessary to have individual finger straps.

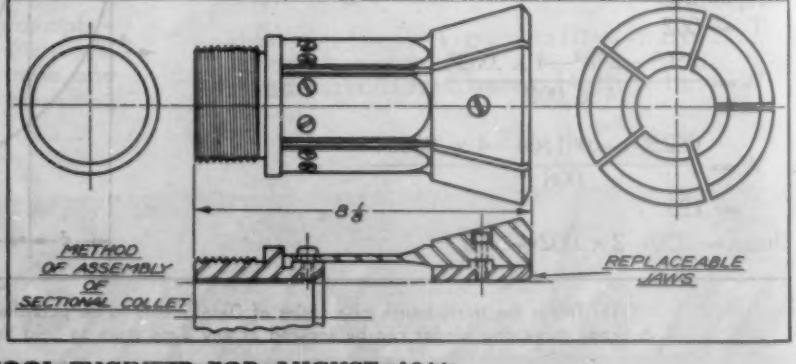
Sectional Collet for Heavy-Duty Jobs

THE CONVENTIONAL type of collet tends to break because of flexing across a segmental arc. A sectional collet, as illustrated below, meets this difficulty.

At present, this device is being used on a tube spinning machine, but it can be easily adapted to a screw machine or any setup where a heavy-duty collet is required.

The collet consists of three separate units: the base, the spring sections, and the replaceable jaws. This particular design has five leaves, is turned on a lathe, then slotted and each section milled flat with a check to fit the slot in the base to protect the screws from shearing off.

Life of the collet seems unlimited. Hardened sections are assembled and spring tempered in the usual manner. However, if the dsigner shows the base with about 1° angle, the necessary opening of the jaws will be obtained, and the sections can therefore be hardened and spring tempered before assembly.



HEAVY SURFACE GRINDING FOR PRECISION

Heavy-duty machines are eliminating hand-scraping and saving as much as 75 per cent of production time

HEAVY SURFACE GRINDING can be and often is a precision operation. Frequently, surface grinding is thought of strictly as an operation on relatively small workpieces. Where used to "hog" off metal on large jobs, it is generally assumed that accuracy is sacrificed, and that a rough job is obtained with a rough wheel.

Actually, large jobs are now turned out at high speed on some of the modern heavy-duty machines, and at standards of accuracy which have permitted elimination of hand-scraping. Flame-hardened ways on large lathe beds, large housing castings, and heavy machine base castings are a few instances among the many which are handled to advantage on modern large capacity surface grinders. Based on the use of standard diameter wheels, many heavy-duty machines have a height capacity of 24".

Advances in abrasive wheel design have kept pace with the advances in grinders. The success obtained in producing a fine, accurate finish on heavy cuts at high speed is creditable in no small measure to the better wheels now being made. The grinders themselves are designed with great rigidity, supporting beds for the work being similar to those found on bed-type milling machines.

WIDE RANGE OF TABLE SPEEDS

The table is as free from deviation with reference to its travel as to its primary support. Traverse actuation by a twin-cylinder hydraulic drive provides a fully cushioned smooth reversal, equal travel speed in both directions. A variable-delivery pump and drive unit permits the use of table speeds anywhere from zero to 100 feet per minute.

Two illustrations of machines of the kind mentioned are shown, one of which is at work on a large housing casting. The other is handling a large machine base casting. In both examples, a final finish is being obtained on jobs that formerly had to be hand scraped. In one case there is a time saving of 60 per cent; in the other 75 per cent.

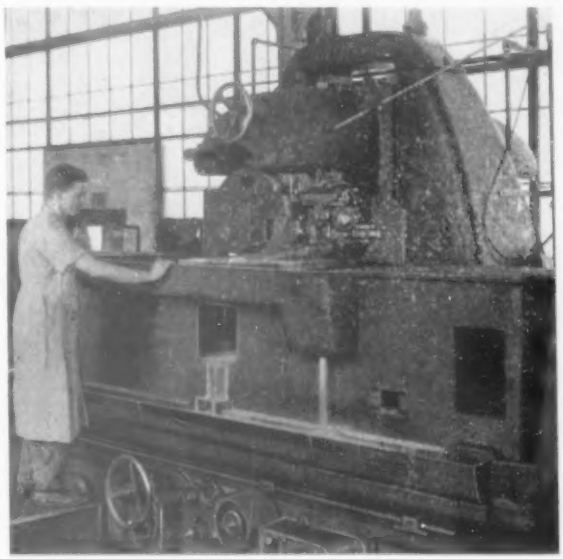
An automatic hydraulic traverse feed for the grinding wheel is provided, and there is also an automatic reversal of the wheel slide, actuated by means of two dogs on a circular disc, positioned within easy reach of the operator and readily adjustable.

Power can be used for raising and lowering the grinding wheel to the approximate point desired, though a handwheel is provided for final adjustment. There is a large adjustable dial under the handwheel, graduated in thousandths, for stock removal in ordinary grinding. A small vernier dial permits grinding to close limits.

These machines are by no means limited to heavy work. They incorporate all of the versatility the production engineer might require, and may be supplied with ordinary magnetic chucks, or with magnetic chucks of special swivel type. They are much used for plate grinding, die grinding, and the hundred and one other jobs that arise in the average metal working plant. THE END

Right:

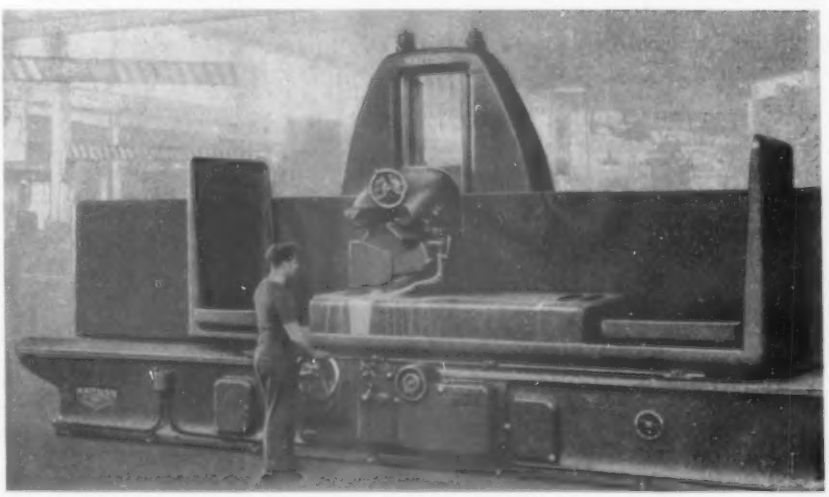
Machine base casting weighing more than 2½ tons in process of grinding on a large capacity surface grinder. Sufficiently fine and accurate finish is obtained to eliminate hand scraping.



Below:

Grinding a housing casting 93" long and 41" wide, weighing nearly 2½ tons. An accurate and smooth finish is obtained.

Mattison Machine photos



STARRETT TOOLS

MEN WHO KNOW THE MEANING OF RESPONSIBILITY

Appreciate the Accuracy and Dependability of STARRETT TOOLS

Left: *W. G. Peterson, Assistant Shop Foreman of PCA.*, using a Starrett "Mike".

Right: *Bill Oprendek, PCA's Airplane Crew Chief* takes a reading on a Starrett "Last Word" Dial Indicator.

Pennsylvania-Central Airlines, now on its eighteenth year of service to America, depends on constant precision maintenance and inspection—*Starrett* precision—no less than do the builders of the planes and engines.

Starrett Micrometers, Vernier Gages, Dial Indicators and other Precision Measuring Tools possess qualities that can only be appreciated by intimate experience—qualities that inspire confidence to do work involving heavy responsibility and do it swiftly, accurately and surely.

Now, with Two Service St. rs

THE L. S. STARRETT CO · ATHOL · MASSACHUSETTS · U. S. A.

World's Greatest Toolmakers

STARRETT

PRECISION TOOLS • DIAL INDICATORS • GROUND FLAT STOCK
HACKSAWS • METAL CUTTING BANDSAWS • STEEL TAPES

Bramson photo

Greater use of high production, special machines, and a postwar boom in light metals and plastics were predicted by these Buffalo production engineers who participated in the fourth in a series of PRODUCTION Round-Tables sponsored by the Bramson Publishing Company. *From left to right:* D. J. Kennedy, Houde Engineering; W. F. Weinreich, Worthington Pump & Machinery Corporation; R. Dustman, Chevrolet Motor & Axle Division, General Motors Corporation; J. J. Lee, Curtiss-Wright Corporation; and *(standing)* R. T. Bramson, publisher, The Tool Engineer.

Engineers Foresee Cost Reduction As Major Machine Tool Requirement

HOW can production costs be reduced sufficiently in mass manufacturing after the war to stimulate consumer buying and enable high level employment?

Four outstanding production engineers from the Buffalo, New York, area discussed this subject at the fourth PRODUCTION Round-Table and agreed that reconversion to competitive, civilian manufacture will witness an ever increasing dependence on new and improved high-production machine tools.

Now engaged exclusively in production for war, representatives from four industries normally producing widely divergent products offered individual answers to a series of questions on trends in metal-working posed by the Editors of this publication in the most recent in the nation-wide series of Round-Tables sponsored by The Bramson Publishing Company.

While numerous problems in war production were discussed at the meeting, the answers to the technical questions presented were based on conditions contemplated in peacetime production.

Though the opinions expressed by the Buffalo conferees were frank and varying, none should be construed as reflecting in any sense the policies of the companies they represent. All answers and opinions expressed at the meeting were those of the men participating, based on personal experience and observation gained in mass production metal-working.

Guests of the Editors at a dinner at Buffalo's Hotel Statler and participants in the Round-Table held there on June 29, were John J. Lee, General Manager, Curtiss-Wright Corporation; William F. Weinreich, Assistant Superintendent, Buffalo Works, Worthington Pump & Machinery Corporation; Russel Dustman, General Superintendent, Chevrolet Motor Gear & Axle Division, General Motors Corporation; and Daniel J. Kennedy, Assistant Supervisor, Standards Department, Houde Engineering Division.

Representing some of the largest users of machine tools and production equipment in the area, the four participants offered opinions based on managerial and practical experience gained in the fabrication of aircraft, automobiles, compressors and Diesel engines, as well as hydraulic and automotive parts. Opinions offered were predicated on war production experience, with a view to postwar competitive manufacture.

In an endeavor to accurately report current opinion on a number of subjects of vital importance to both producers and users of machine tools, the Editors posed the seven specific questions in the Bramson Publishing Com-

Four outstanding production engineers foresee product cost reduction through the utilization of improved special and automatic machine tools. Here is the report on the fourth in a nation-wide Round-Table series

pany's PRODUCTION POLL of the Metal-Working Industry. The "yes" and "no" answers received from the Buffalo production men have been incorporated in the percentages reported elsewhere on these pages.

The individual explanations by the Buffalo conferees for their answers to these questions add significance to the percentages reported and should assist in an analysis of trends in thinking among such large buyers of metal cutting and fabricating equipment.

WAR PLANT EQUIPMENT DISCUSSED

Agreement was unanimous at the Buffalo meeting that greater precision would be utilized in postwar manufacture. This reaction was in sharp contrast to that of New England production engineers polled a month earlier at Hartford, Connecticut, as well as samplings of opinion from other industrial centers reported last month in this magazine's PRODUCTION POLL.

Replacement of pre-war equipment with war-built or DPC machine tools was envisioned by three of the men at the meeting, but only as a stop-gap until such time as machinery builders could offer units that would maintain war-time tolerances while cutting metal-fabricating costs. The implication was clear when the fourth conferee said flatly that he doubted "if we will use much if we are going to be in competitive manufacture when war ends."

The consensus of opinion was summed up by Dustman, of Chevrolet, who said, "I believe that probably it is going to be necessary to use a certain amount of this equipment to get started because I don't think the machine tool industry will be able to produce the necessary special tools immediately."

Weinreich, of Worthington Pump, pointed to the probability that more of the larger war-built machine tools would be used than of the smaller, less expensive units.

Every man at the meeting foresaw the need for changes in machine tools to fully utilize recent improvements in cutting tools. Substantial changes in machine design and additional power were specific requirements suggested.

In voting 100 per cent for changes in the position of machine tool controls to save time and effort on the part of operators, the conferees pointed to the probability of high wage rates and the need for reduction of worker-time charged against production.

On the basis of discussion at this and previous Round-Tables, much education remains to be done before production men generally can visualize the potentialities of electronic controls for machine tools.

The problem of electronic control maintenance was raised when one participant said, "Our control engineers were quite enthusiastic and put in several installations which they thought were the last word—but, they didn't have enough electrical engineers to keep them running."

In answering the question "Are lubrication systems on machine tools today efficient, adequate and accessible?" the response was an emphatic "no." Emphasizing the seriousness of this complaint, Lee of Curtis-Wright said, "We are completely revamping all of our equipment."

Special situations and types of peacetime production affected answers to the last question, "Do you see a trend toward a reduction of stock removal for finish?"

Basing his personal opinion on automotive experience, Dustman discounted the possibility of greatly increased utilization of precision forging, casting, stamping and stretching. "We find in our work," he said, "particularly in steel, that when you reduce the amount of stock you increase the amount of magnaflux inclusions and have a tremendous amount of scrap." Because of the high standards of product quality in certain automotive engine parts, he pointed out, reduction to a small amount of finish in forgings proved wasteful. The percentage of rejects mounted unreasonably, he said.

With Chevrolet contemplating the magnafluxing of still more parts in the postwar car, Dustman suggested the trend toward a reduction in stock removal in heavy auto parts is hardly likely.

"Yes" answers to this question came from Kennedy, of Houde, as well as Lee and Weinreich. However, they foresaw evidence of this trend largely in the fabrication of smaller, lighter parts in postwar manufacture.

WHAT THEY SEE IN THE FUTURE

Interesting and noteworthy trends in thinking among leaders in the metal-working industry were revealed in answers to other questions.

The consensus of answers to these questions, offered by participants in the Buffalo PRODUCTION Round-Table, follow:

1. What ideas have you for standardization of machine tool parts to simplify maintenance?

Spontaneous and immediate reply to this question indicated an apparent need for much attention to standardization by machine tool builders.

Lee said he hoped for standardization of "all motors and speed reducers, as well as mountings so that so many different sizes wouldn't have to be carried in stock." Standardize them so they will fit any other machine, he suggested.

Dustman pointed to the efforts of the General Motors organization to standardize production equipment, with specifications covering electrical equipment, loading heights, leveling mechanisms and a single grade of oil for hydraulic systems.

Standardization on ball and roller bearing was asked by Weinreich. "In many cases," he said, "we find that the use of specially designed bearings for particular jobs could be substituted for a standard roller bearing which you can buy from the manufacturers."

After citing a need for standardization in hydraulic installations, Kennedy recommended such attention to turret lathes. "If the manufacturers got together and designed the same face plates, chucks and tool holders," he explained, "we could eliminate unnecessary tool-making to adopt many tools to different type lathes."

2. What effect will labor rates have on the selection of equipment in your plants after the war?

The Buffalo production engineers visualize an ever increasing dependency on machines in postwar manufacture to compensate for high wage rates. Competitive production at prices anywhere near prewar levels, they agreed, is possible only if output is controlled by machines and not by men. Maintenance of satisfactory postwar employment levels will be possible only if manufacturers can keep product cost sufficiently low to sell, these production men reasoned. Elimination of man-hours on parts and products, they pointed out, is the only sure way of employing more workers.

The importance of production machinery in postwar manufacture was highlighted by the observation made by one Round-Table participant that "labor rates are so high that they will become the outstanding cost item of the postwar product."

3. To what extent, if any, will special or automatic machines replace single purpose machines in postwar mass production.

That automatic, special machinery will be the rule rather than the exception in postwar metal cutting was the belief expressed by all participants at the Buffalo Round-Table.

"You will have to use special machinery for any product that is within the range of the consumer public," Lee predicted.

A suggestion that the machine tool industry could do much to simplify setups on special machines was made by Weinreich, who said, "Some automatic machinery is quite difficult to set up. It takes a lot of time which prohibits employment of this machine to small production quantities."

Apparent lack of flexibility in today's special machines led Kennedy to the opinion that "we will be adopting a single purpose machine by proper tool design to do a complicated operation in a simple way rather than with an expensive special purpose machine."

4. Do you expect to be required to fabricate parts to finer tolerances than were required before the war?

Lesson learned in war production and the conviction that the machine tool industry will soon produce improved equipment convinced all four conferees that postwar manufacture will witness substantially closer tolerances.

Relating tolerance to improved product quality at lower costs, the Curtiss-Wright engineer predicted still greater demands in tolerance. These, he said, will be obtained with better equipment and at no hardship in actual production.

Dustman reflected automobile industry-thinking in stating that "we are learning every day to produce equipment and tools which make it possible to obtain extreme precision as easily as we obtained our old standards in tolerance. Undoubtedly, I think, we will make more precision parts. I don't think we will ever stop improving or increasing the number of precision items."

Despite the general belief that tolerances would be advanced in postwar production, several of the men pointed to the fact that tolerances in some products and items can become excessive and unreasonable. Such standards on interchangeable war product parts, set by designers unfamiliar with production facilities and methods, were cited.

Nonetheless, these men agreed, closer tolerances and finer finishes where they will improve product quality, will be demanded just as fast as machine tools which will maintain such standards are made available to the metal-working industry.

5. Will improved machine design be required to enable you to meet greater precision at competitive production costs?

The participants visualized "a complete redesign of machine tools after the war," indicating that much existing equipment will be scrapped or otherwise disposed of.

Since machine tool builders cannot offer radical new designs or substantially improved equipment unless they have a ready market, the industry could take encouragement in Lee's observation that "the day of keeping a machine running as long as it stands on its legs is over."

6. Do you contemplate an increased use of new materials, such as light alloys, magnesium and plastics?

This question produced the longest discussion at the Buffalo meeting. That production men are anticipating an age of light metals and plastics was an unmistakable conclusion.

Relatively low fabricating costs and high material costs were respective advantages and disadvantages cited for light alloys and plastics.

Lee, whose aircraft experience fitted him to discuss aluminum and magnesium, directed attention to the postwar possibilities of reducing product price by making use of the low machining costs of these materials. High wage rates, he suggested, might be more than offset by low man-hour consumption in fabrication.

Pointing out that automobile building is highly competitive from the price standpoint, Dustman predicted increased use of light metals and plastics just as rapidly as it could be proved that costs could compare with materials now used. Plastics, he pointed out, were being used in greatly increased quantities just before auto production was stopped for war. The trend to plastics in auto parts and accessories, he reasoned, could be expected to continue after auto output is resumed.

Weinreich predicted a trend toward the use of lighter metals in heavy machinery and power equipment, if the material price will come down. Portability of lids and covers without using cranes was an advantage gained in applying light metal in such products, he said.

7. Will it be cheaper or more expensive to fabricate with these materials?

Though it was agreed at the Round-Table that tooling costs for plastics and light metals might be higher in some instances, labor costs always would be lower. "I think that is one of the advantages of going to lighter metals," Dustman said. "Certainly in plastics, after the original cost, your manufacturing costs are much lower."

8. What effect will this have on the kind of machinery and tools you will use?

Lighter machines, fewer tools and higher horsepower to compensate for increased speeds were the major conclusions reached in the discussion of this question.

Citing the use of plastics on automobiles, Dustman foresaw reduced machining requirements. For example, he pointed out, holes in small parts may be die cast. "It might only require cleaning out and reaming for final size," he explained. "That is particularly true on the trim parts of a car. And today, you see the handles on screw machines made out of plastics, molded to shape, with very little work required on them. Undoubtedly these manufacturing advantages will be utilized in automobiles."

Despite the lower horsepower requirements generally claimed for cutting the light metals, experience at this Round-Table indicated a need for greater horsepower in machine tools if a boom in these materials develops.

Lee, whose recent experience has been largely in aluminum and magnesium, pointed to several standard machines in his shops that were equipped with 7½ horsepower motors when purchased from the builder. "When we got replacement machines for the same equipment," he said, "we had 30 horsepower motors installed on them. That is an indication of how much more power will be required."

In the final analysis, the Buffalo engineers agreed, horsepower requirements depend entirely upon the individual job. Examples from prewar production with ferrous metals were cited in which horsepower was so great that it distorted the workpiece, and it was impossible to find a satisfactory method of holding the part.

More horsepower will be required for machines in which light metals are cut, it was reasoned, while machines for ferrous metals may have to be redesigned to permit utilization of the higher speeds made possible by improved cutting tools. THE END

The Bramson Publishing Company's
PRODUCTION POLL
of the Metal-Working Industry

• Staff Editors of this publication believe the answers to these questions are of vital interest to users and producers of metal-working equipment. The questions are posed in an effort to establish current trends in thinking on subjects important to postwar mass production industry. Answers gathered from the more than 20,000 readers of this magazine and at its PRODUCTION Round-Tables each month, should accurately reflect the thinking of the metal-working industry in the United States and Canada.

QUESTION	Per Cent Replying YES	NO
1. Do you envision greater precision in postwar manufacturing?	75%	25%
2. Where advisable, will you replace prewar equipment with war-built or D P C equipment?	87%	13%
3. Are changes in machine tools indicated to fully utilize improvements in cutting tools?	100%	——
4. As a general rule, should machinery controls be changed so as to provide greater motion economy on the part of operators?	100%	——
5. Do you favor electronic controls?	59%	41%
6. Are lubrication systems on machine tools today efficient, adequate and accessible?	2%	98%
7. Do you see a trend toward a reduction in stock removal for finish, by such means as precision forming, castings, forging, stretching etc?	84%	16%

MACHINING CLEAR PLASTICS

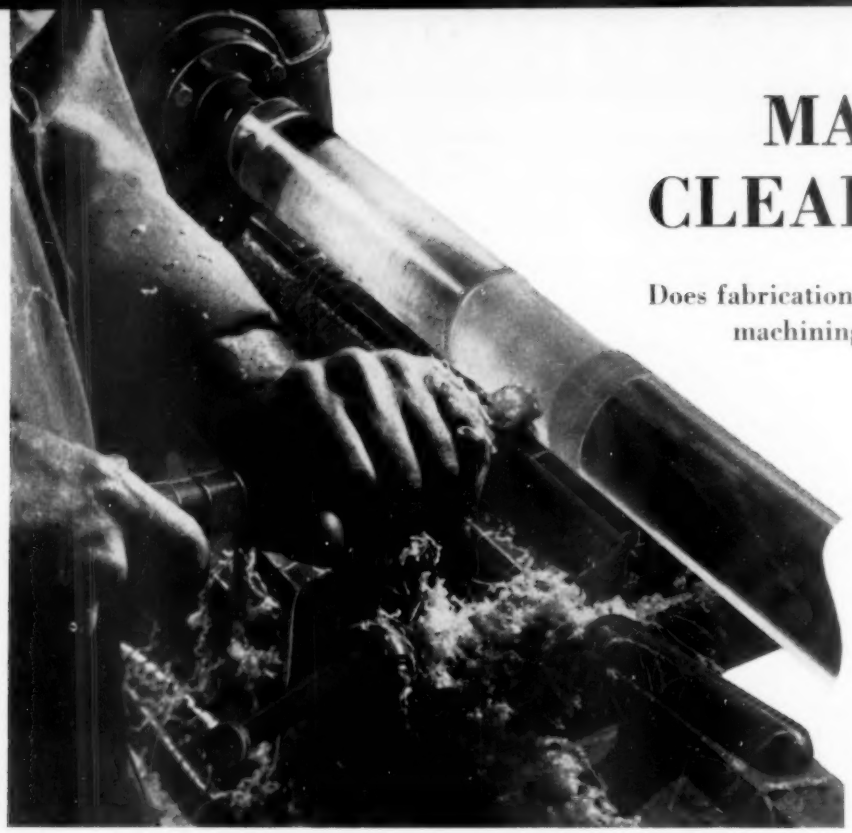
Does fabrication from clear plastics call for special machining methods and equipment?

Read the answer here on the use of standard cutting tools and fixtures for machining two types of plastic.

You may find applications that will work in your shop

●

Du Pont photographs



Conventional wood and metal turning equipment, such as hand and turret lathes and automatic screw machines, are suitable for machining Lucite. Increasing top and side rake of steel-cutting tools will improve performance. Front clearance angle of wood-working tools should be reduced to support the edge.

HENRY O. BELLEVILLE
E. I. DU PONT DE NEMOURS & COMPANY

MACHINING acrylic and cellulose acetate types of airplane enclosures and similar structural fabrications from "Lucite" methyl methacrylate resin or "Plastacele" cellulose acetate plastic is accomplished by procedures similar to those employed in working wood, light metals, and some plastics.

Anyone experienced in machining brass should have little difficulty in working Lucite or Plastacele. Machining qualities of these plastics are similar to those of brass and the light metals. Good craftsmanship, suitable equipment, and proper design, however, are just as essential in obtaining successful results as they are when other materials are used.

TOOLS MUST BE SHARP

Because tools should be kept sharp for all operations, hard, wear-resisting tools with cemented tungsten carbide tips are preferred. They wear longer, operate better at higher speeds, retain their sharpness longer, give a better finish and, all in all, improve production rates and contribute to more economical results in the long pull.

Unlike metals, plastics generally are poor conductors of heat. Thermoplastics such as the acrylics and cellulose acetates tend to soften under the high temperatures generated during machining. Consequently, coolants, or preferably an airblast, must be directed upon the work to dissipate frictional heat. Liquid coolants are less desirable because they cause chips and shavings to adhere to the plastic. Furthermore, water must be used sparingly on Plastacele since the substance is moisture-sensitive.

It is possible to machine both these clear plastics to extremely high degrees of accuracy. However, in most applications some compromise must be made between fabricating costs and precision. Furthermore, the relatively high coefficient of expansion of both plastics defeats the purpose of precise workmanship where pieces are destined for service under widely varying temperatures.

MACHINING TOLERANCES

It is practical, in airplane enclosures for instance, to work either of these plastics to tolerances within a plus or minus of 1/64" on machined surfaces. A linear tolerance of plus or minus 1/64" for Lucite and 1/16" for Plastacele can be maintained with reasonable care and good equipment. The contour of formed parts of Lucite can usually be held within plus or minus ⅛", while similar pieces made of Plastacele may ordinarily be held within a plus or minus of 1/16", although the size and shapes of such pieces may cause slight variations from these norms.

Economy of fabricating costs may often be obtained by designing associated parts of an assembly or structures so that broader tolerances may be employed and fabricating steps reduced. It is, of course, obvious that designs should be projected with due consideration for the limitations imposed by the standard sheet dimensions of the plastics. This is of paramount importance in planning for Plastacele, since the largest sheets that can be produced measure 21" by 51".

Divergent principles of design govern in the case of each of the two materials. Because cellulose acetate is not so rigid as Lucite, Plastacele pieces must be given greater support than similar pieces made of Lucite if both are designed to withstand the same degrees of wind pressure. Nor can cellulose acetate sheeting be drawn so deeply as can acrylic sheets without causing optical distortion. It is better design, therefore, to fabricate such large structures as enclosures from a number of small segments of Plastacele rather than from fewer larger sections.

STANDARD FIXTURES USED

Fixtures that simplify repetitive jobs, such as routing, drilling, and cementing, and jigs for guiding tools used in large scale operations with wood and metals, are employed with equal effectiveness in the volume production of parts from Lucite or Plastacele. Such devices are normally of wood or plastic construction but, when extreme accuracy is demanded, may be made of metal. The sharp edges of such metal fixtures and jigs should be rounded and smoothed. Flannel, rubber, or other soft coverings should be cemented to surfaces that come in contact with the plastic.

For sawing operations, cutting lines may be scribed directly upon the surface of Plastacele, but are preferably penciled on the masking paper protecting Lucite. However, when extreme accuracy is required the lines may also be scribed directly on Lucite if the masking paper is replaced to within ¼" of the cutting lines before sawing. Jigsaws, bandsaws, or circular saws of wood and metal working types are successfully employed with these plastics, with specifications as to set of teeth and gauge of blades dictated by

Now—for the first time—standardized air gage spindles and components for checking long, short, through or blind holes at the gage or remotely at the machine or bench. *You can write your own specs!*

No more engineering time and charges! Deliveries shortened to a matter of days. Interchangeability of spindles and components enables adoption of complete air gaging program at minimum cost and minimum gage inventory.

No more GO and NO GO checking of internal diameters. Both tolerance limits are checked in one pass faster than either could be checked with a plug gage. Frequent, time-consuming and therefore costly, inspections of gages are eliminated. Precisionaire spindles outlast plug gages 10 to 40 times.

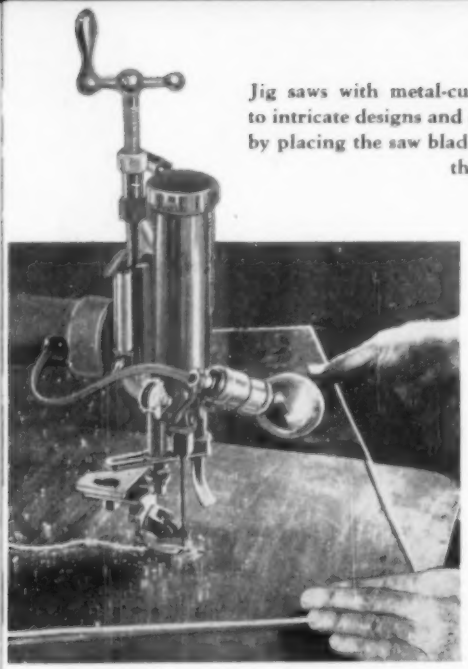
No more human element of error when you use the Precisionaire. Parts with tolerances ranging from .005" to fractions of .0001" can be checked quickly by unskilled and untrained operators who merely present the gage to the part or vice versa.

THE SHEFFIELD CORPORATION

Dayton 1, Ohio, U.S.A.

MACHINE TOOLS • GAGES • MEASURING INSTRUMENTS • CONTRACT SERVICES

WRITE for Engineering Data No. 12 detailing STANDARDS and also showing SPECIAL applications.



Jig saws with metal-cutting blades are suitable for cutting plastics to intricate designs and curves with small radii. Accuracy is improved by placing the saw blade guide close to the work to keep the weave of the blade to a minimum.

the particular application being fabricated.

Standard vertical-spindle drill presses of the single head, multiple head, or radial types are used for drilling both plastics. Spindles should be free of play to avoid damage to the work. Portable drills have been used but results have not been accurate. Plastacele has also been drilled on a lathe.

Standard drills can be employed, since a tendency to grab has been overcome by use of a drill modified to the following specifications:

Flute angle	17°
Lip angle	70°
Lip clearance angle	4° to 8°
Polished lands, ¼ width of heel	
Polished land heels	

For drilling thin sheets of both materials, a flat-faced drill such as is produced by most manufacturers for use with cellulose acetate has been designed. A modified long-lead twist drill with a sharp lip angle has also been designed for use with thin Lucite sheets. Hollow end mills (trepanning tools) are good for drilling large holes in thin sheeting when mounted on a vertical drill press. Fly-cutters are useful for cutting holes larger than 1" diameter in heavy sheeting.

Drill feeding rate is a matter of experience and judgment. The rate of feed should be decreased as the depth of the cut increases. An average speed of about 120" per minute has been found excellent with amply lubricated equipment. The best lubricant for drilling is a thin, mild, soap solution. Shallow holes may be drilled satisfactorily without lubricant if care is exercised in feeding to avoid overheating. However, holes will be improved if an air jet is directed at the drill.

Both plastics can be tapped and threaded but when they are being machined to fit metal butts or bolts, allowances should be made for the difference in the coefficients of thermal expansion of the metal and plastic. A slight increase over normal metal clearances is usually ample. Either hand or machine methods may be employed. The materials also work well in lathes or automatic screw machines. Standard taps and dies may be used.

Techniques and tools for routing Plastacele and Lucite are similar. Flat surfaces can be cut on standard milling machines. Wood shapers, routers, and jointers give excellent results for both contour and step routing. For trimming edges of sheets and for surface routing of intricate designs, portable hand routers are useful.

Stationary and portable belt sanders, reciprocators or vibrators, discs, and flexible-shaft drum sanders have all been used successfully on both Lucite and Plastacele. Even hand sanding is frequently employed. Drum sanders are most suitable for curved edges, while disc sanders work well when removing material from straight edges and outside curves. Belt and vibrating sanders can handle flat surfaces.

Clear plastics are sawed easily with a wood- or metal-cutting circular saw having five to eight teeth per inch and no set. Stiffening washers at the shaft minimize vibration. Gummy deposits are removed by washing the blade with a solvent.

WET SANDING PREFERRED

Coarse abrasives ordinarily are used in roughing operations. For finishing, the usual procedure of selecting an abrasive just fine enough to remove scratches left by the previous agent is as applicable to these plastics as to other materials. For best results sanding machines should be operated at about 2500 sfpm when Plastacele is being worked and at about 3000 sfpm on Lucite. Wet sanding is preferred.

If surfaces become scratched during fabrication or otherwise, proper ashing and polishing will generally restore the original finish. Single or double spindle buffing lathes are suitable for these processes when applied to pieces that can be manipulated. For larger parts, portable electric, flexible-shaft, or pneumatic machines are useful. Speed and pressure are critical factors in the finishing operations. Both should be held within limits that prevent overheating of the work, and pressures should be light and even.

Articles of considerable size can be fabricated from these two clear plastics by assembling sections cemented together and strengthened by means of ribs and stiffeners. Cements employed to join sections function by first softening the contact surfaces through a process of solution. The surfaces then weld together to form a strong bond.

PLASTICS EASILY CEMENTED

Two types of cement are provided for each of these two plastics. For Lucite glacial (100 per cent) acetic acid is readily available. The edges to be united are immersed in the fluid and softening is hastened by warming the acid which, if maintained at 140° F., will prepare the surface for cementing within two to five minutes. Joints may be handled in about three hours and machined in 16 to 24 hours.

A quick-acting solvent cement offered by the makers of Lucite softens the material in from two to five minutes at room temperature, and 30 minutes after the joint has been made, the piece may be handled. It is ready for machining in five hours and attains full strength in 24 hours. The manufacturer supplies a monomer cement which solidifies the bond by polymerization rather than by diffusion and evaporation.

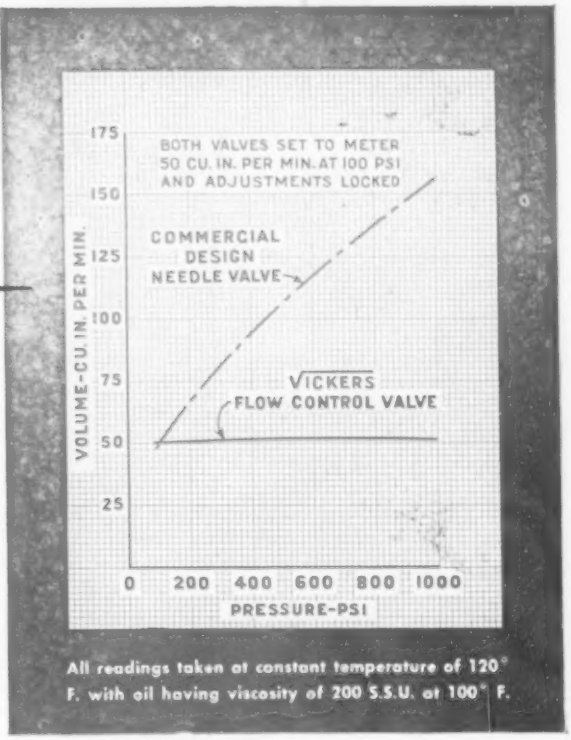
A solvent type cement and a dope-type which create a film between the two surfaces to be joined create effective bonds uniting two sections of Plastacele. Both, likewise, are manufactured by the producers of the plastic.

THE END

CONSTANT FLOW RATE

Regardless of

VARIATIONS IN FLUID PRESSURE



As shown by test chart at right, the Vickers Flow Control Valve maintains a practically constant metering rate (for a given setting of the control adjustment) regardless of variation in fluid pressure. This ability to accurately control the rate of travel of tool head or slide . . . or the rpm of a hydraulically driven work spindle . . . at all times regardless of the resistance encountered is a fundamental requirement of many types of machine tools and special machinery. The absence of a hesitation, jump or a speed variation with a load change is important because these nearly always are detrimental to tool life, work finish or proper operation. Tool damage when "breaking through" work is eliminated and variations in cut or operating pressure have no appreciable effect upon feed rate. See Bulletin 40-15 for complete information.

Vickers Application Engineers will gladly discuss with you how "hydraulics" can be used to your advantage.

VICKERS

Adjustable FLOW CONTROL VALVES

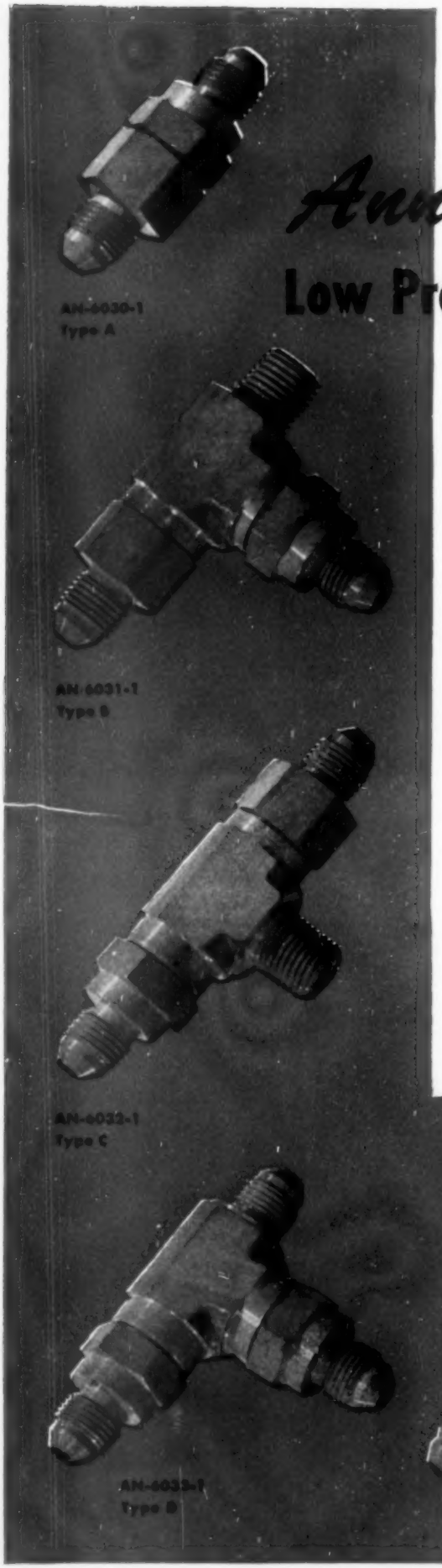
VICKERS *Incorporated*

1416 OAKMAN BLVD. • DETROIT 32, MICHIGAN

Application Engineering Offices: CHICAGO • CLEVELAND • DETROIT • LOS ANGELES
NEWARK • PHILADELPHIA • ROCHESTER • ROCKFORD • TULSA • WORCESTER

Representative of More than 5,000 Standardized Vickers Units for Every Hydraulic Power and Control Function

CONSTANT DELIVERY PUMPS | FLUID MOTORS | DIRECTIONAL CONTROLS | VOLUME CONTROLS | PRESSURE CONTROLS | CONTROL ASSEMBLIES | VARIABLE DELIVERY PUMPS



Announcing Approved A. N. Low Pressure Oxygen Check Valves!

The Deutsch Company is proud to present its new series of low pressure oxygen check valves. The performance of the valves conform to the requirements set forth in specification AN-V-15. The internal construction incorporates the "O" ring sealing principal, but the various styles meet all AN envelope dimensions.

The poppet is patent applied for and is the special feature of these new valves. It positively eliminates excessive squeezing of the sealing element and absolutely does away with the possibility of the gasket tearing loose or cutting through and being lost in the line.

The valve functions as a sleeve valve, the clearance of which is sealed by an "O" ring type gasket when valve is closed. The sealing element is made from special freeze resistant neoprene of low Shore hardness to insure proper functioning between −65°F and +160°F.

The valve has very low pressure drop in the free flow direction, and the following superior flow characteristics in the checking direction:

Position of Valve	Line Pressure both sides of Valve	Maximum flow L/M at Atmospheric Pressure before Valve Checks
Valve closes against gravity	50	26
	100	33
	200	53
	300	65
	400	77

THE DEUTSCH COMPANY

formerly American Screw Products

7000 AVALON BOULEVARD • LOS ANGELES 3 • CALIFORNIA

CAPITAL COMMUNIQUE

T.M. REG. BY THE BRAMSON PUBLISHING COMPANY

T. N. SANDIFER

Special dispatch from THE TOOL ENGINEER'S *Correspondent in the nation's capital.*

WASHINGTON

THE outlook for any substantial return of present war production to making peacetime articles is shifting from week to week, with the changes in the war. To get an accurate picture it is only necessary to read the war news.

Major automobile manufacturers, who have just conferred for the second time in little more than a month with the War Production Board, on problems of their own possible reconversion at some indefinite time, were in apparent agreement on this appraisal.

WAR REMAINS THE NO. 1 JOB

Production space, new models, technical personnel, and the necessary equipment—machine tools and materials, are all geared to war changes, it was made plain by the automobile men themselves.

For this reason the proposal advanced at the meeting with WPB representatives, that manufacturers start now on experimental models, evoked little enthusiasm. However, the way is open for sufficient development to make it probable that auto production lines will not necessarily be making the last pre-war standard model when they do resume. The same broad official modification of the previous restrictions against experimental peacetime models will apply to other peacetime production.

Even though auto manufacturers individually said they were uncertain if they could begin intensive work on new models at this time, due to lack of facilities now on war work, and lack of technical personnel, also on war jobs, the possibility that some models might be made led to an extensive discussion behind-scenes, of tooling-up problems, as did the earlier meeting.

SWPA PRICES ON USED TOOLS

Just prior to the meeting of auto industry men with WPB, the Surplus War Property Administrator announced a price policy for disposal of Government surplus used machine tools. Thus the manufacturers had some tangible information to go on at the conference, and the statement of policy raised some interesting questions.

The object, Surplus War Property Administration stated, is to establish a pricing policy that will put surplus machines back into production as quickly as possible, at the same time, giving the Government an adequate return on its outlay for these machines.

The price plan adds five percent more for tools sold to a purchaser or lessee who has the tools at his own plant. This is on the theory that the buyer will be saving freight, also he knows exactly what the condition of the tools is. What some manufacturers wanted to know was what would happen if they decide to buy their tools at some outside plant, thus saving 5 percent on the price. This point will have to be considered by Surplus War Property, it is indicated.

Meanwhile, auto men in response to their own questions, were told substantially this: They may buy a piece of equipment at some other plant, or site, for release whenever present production will permit. However, they cannot be guaranteed any definite date on which they can take delivery of this equipment; as delivery will depend on the war.

This automatically raised another question as to conversion possibilities: If the industry, or any industry, cannot be certain when it will get such equipment, its plans for going on peace production will be equally uncertain. In view of this, what is their outlook for getting new tools, including special purpose tools? The fact also that it may be possible to turn out a postwar model, it was pointed out, makes it more important to know what new tools may be obtainable.

The plan has been announced to permit some ordering of new tools, especially of kinds that may take a good many months to complete, since a lag in production conversion might result if the delay came after the definite order permitting the change-over.

Such orders will be unrated, it was explained to the auto men, or at least, will have low ratings. Orders for new tools now must come behind those for equipment needed, say, for locomotive production, or some other more essential need.

A summary of the outlook, after the meetings recently would show, it is said reliably, that industry reconverting can feel assured of ample tools for its needs. This obviously refers to the large surplus, but also to the limited orders for special tools that probably will be placed in anticipation of changing production needs. This apparently assumes a number of things, including that tools will be moved promptly, both from production space needed for other use, and to new sites, as in the case of tools bought and held for the purchaser.

It will be recalled from a previous Capital Communique column that industry men have been greatly concerned lest the government delay unduly in moving such equipment, once the war makes it possible for plants to go on other work. Any delay in disposing of these tools would obviously tie up new work.

"KNOW-HOW" MEN UNDER STRAIN

While this situation did not receive as much attention at the recent meeting as previously, it is believed that the Government must still complete its plans, and in this connection, the uncertainty of the war from day to day is a handicap.

A new factor, at least as far as public discussion is concerned, is the pressure on engineering and other technical personnel, engaged in war production. Shortages as well as the work demand on such personnel, it is said here, is one of the main obstacles to intensive postwar production planning at present. These men simply cannot be spared from vital daily work for the necessary preparatory research and experimental production.

CONFLICT REGARDING MANPOWER

Not alone has industry, especially the auto industry, emphasized this situation. It is reflected in recent warnings from the War Manpower Commission. The latter, as has been the case too many times, appears once more in conflict with some other agencies, if not within itself; however, it points out that so far, munitions cutbacks have not materialized as widely as was anticipated a while earlier, and some 200,000 additional new workers will be needed in war production.

This outlook contrasts with War Production Board plans for easing up on some civilian production. The question of future manpower needs came up when the auto industry men were here. They were asked what would happen to engineering personnel once the war demand slacked up, and one major auto company official said, with the concurrence of other members, that men in engineering departments would then go on auto problems.

PROGRAM IN STATE OF FLUX

The general picture, it will be gathered, is one of uncertainty on reconversion and the things that go with it. This is true even in the face of the apparent victory scored by Donald Nelson, chairman of WPB, over a number of subordinates and even superior agency heads in other departments, on his reconversion orders.

Apparently the opposition was satisfied with the concession by Nelson that the limited reconversion orders, essentially confined to release of certain materials and some manufacture of needed every-day articles, would be put into effect on a graduated scale.

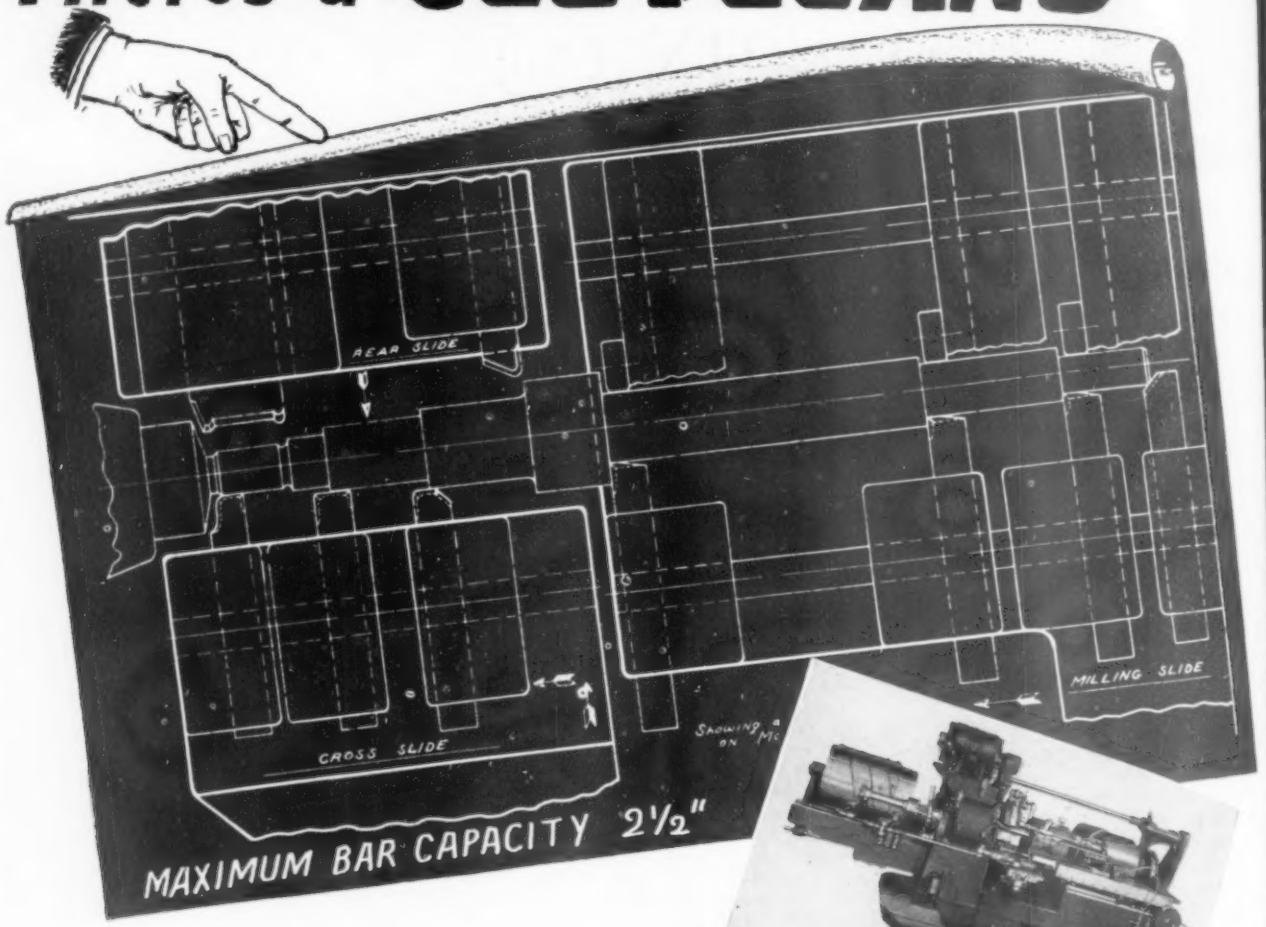
Actually, while it was not emphasized, the fact is, the whole program is

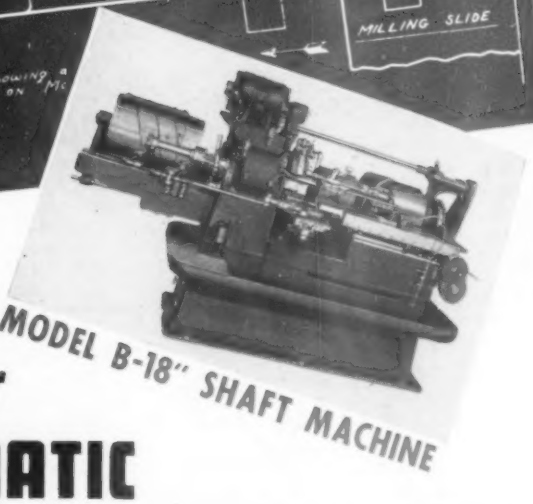
(Concluded on page 111)

●Opening guns in a program of gradual shift from war to civilian production are four significant WPB orders:

***July 15*—Some restrictions on use of magnesium and aluminum lifted. *July 22*—Go-ahead granted on producing experimental models of postwar products. *July 29*—OK given placing of rated orders for postwar-required tools. *August 15*—WPB field offices to be authorized to approve civilian production in individual plants.**

There's a CLEVELAND





MODEL B-18" SHAFT MACHINE

Remember— CLEVELANDS CUT COSTS!

for AUTOMATIC ECONOMICAL PRODUCTION

of MULTIPLE DIAMETER Shafts, Spindles, Studs, Bolts, etc. . .

Ask for Cleveland Bulletin on Automatic or Die-casting Production Equipment

CHICAGO (6):
1408 Civic Opera Building
DETROIT (2):
540 New Center Building
NEWARK (4):
902 American Insurance Bldg.
CINCINNATI (2):
1315 American Building
HARTFORD (1):
529 Capitol National Bank Bldg.

THE CLEVELAND AUTOMATIC MACHINE CO.
CLEVELAND 3, OHIO

—CAPITAL COMMUNIQUE—

(Concluded from page 109)

subject to reconsideration, and later in the Summer will be reviewed, in the light of the war situation at that time.

There has been an unexpected spurt in war production plans, primarily attributed to changes in war equipment—such as a new demand for more tanks and more big guns, also large-calibre shells, and where such production has been stepped up, the word reaching here is that so-called "cut-back jitters" are subsiding.

It is believed that much of the opposition of the War and Navy departments to the Nelson plan was based on a fear that if workers in war industry saw others beginning to get jobs in peace-manufacture, there would be wholesale shifts of war employees to such normal production, leading to increasing uneasiness among those who stuck to war jobs.

LAWMAKERS DIDN'T FINISH JOB

Congress only got as far as agreement on termination of war contracts legislation before taking its recess, and the prospect is now that further action, including legislation covering disposal of surplus war property, will be late in the year, unless the war suddenly makes it imperative for the boys to return to Washington and enact the pending bills as emergency measures.

Some rather deep political implications are involved in the surplus disposal problem. The pressure is increasing for a disposal policy that will allow smaller plants to participate in the distribution on a liberal basis, if not actually a preferred one. Furthermore, the Department of Justice is showing increasing interest in the whole program, from the angle that it does not want to see a corner on such goods, and does not want to see major interests shutting out smaller concerns on goods that will permit the latter to enter the production field on a competitive basis.

FOREIGN VS. DOMESTIC NEEDS

Then there is pressure from the international policy angle, to use this surplus to some extent at least, in rehabilitation abroad. There may be a tendency later to earmark some items in fact, to insure a reserve for this purpose. This last possibility is not taken too seriously, because of the furore it would start at home among interests that might feel slighted.

However, from these generalities it can be seen that Congress was not too anxious to get into the matter before election. Finally, any question of surplus disposal brings back the situation mentioned at the beginning of this article—American plants want a lot of this material, especially the government-owned machine tools. They are in a position where they cannot plan definitely on production schedules and equipment needs because of the war, and they will want to be assured, as they have been, that the tools will be on hand.

That probably will be a fundamental tenet of any legislation to be adopted this Fall, on the ground that re-employment of present war workers on peacetime goods is the first essential when the war permits. THE END

MEET ONE OF THE 400*

* THERE ARE MORE THAN 400 STANDARD MODELS OF PIONEER Pumps

JUST THE RIGHT PUMP for every coolant need is assured through the remarkable range of application afforded by the 400 standard models that bear the PIONEER name.

And they're the *longest-lived* coolant pumps ever built because PIONEER *does not sacrifice a single quality feature.*

Proof of their superiority? You'll find them on *most of the leading machine tools.*

PIONEER
MODEL VBD
(VERTICAL BRACKET)

HANDLES COOLANT HEAVILY POLLUTED WITH ABRASIVES

This model is capable of functioning with full efficiency with an extremely low water level, particularly in shallow places out of the range of most pumps. Ideally suited for external application on grinding, honing, lapping, superfinishing and sanding machines.

PIONEER Pumps
HIGH EFFICIENCY • LOW POWER CONSUMPTION
GREATER VOLUME AND LESS MAINTENANCE

Pioneer Pump & Manufacturing Co.
19645 JOHN R ST. • DETROIT 3, MICHIGAN

MACHINE TOOLS

. . . news and trends in the Machine Tool Industry . . .

Manpower Stymies Industry Flooded with New Orders

Flooded with new orders as a result of relaxed screening by WPB, machine tool builders fell farther behind during May.

Pinched both for manpower and facilities, they watched order books fatten substantially for the second consecutive month as $19,111,000 on unfilled business was added to April's backlog, bringing the total of unfilled orders at the end of May to $186,343,000.

Contrary to earlier and premature trade press reports, official government figures reveal that the builders actually boosted shipments one per cent in May over those in April, moving $41,712,000 in new machine tools out of their plants. April shipments totaled $41,370,000. Admittedly, the gain in May amounted to a scant $340,000.

New orders in May, less cancellations, totaled $59,852,000. Since new orders in April totaled $55,247,000, May's business represented an increase of $4,605,000, fully 8.3 per cent. Though firm orders in May jumped 6.3 per cent over those in the preceding month, cancellations tumbled 42.4 per cent.

Machine tool builders see little chance of cutting their backlog before Fall. Unfilled orders in May jumped 11.4 per cent over April, and the backlog is now estimated at four and one-half months. The delivery outlook before the current spurt in order writing had improved to the extent of one to three months delivery promised.

The conditions affecting the machine tool delivery outlook are now well known. Caught first with shops filled with 25 per cent or more of other war work, the builders face the current boomlet with still other strikes against them.

The manpower situation in the industry has become very critical, with the loss of younger, versatile men seriously impairing operations. Reports now are current that some shops are operating at between 50 and 75 per cent capacity as a result of the manpower shortage.

Still more recently, builders have found themselves unable to secure subcontracting facilities, as well as fractional horsepower motors and antifriction bearings for their own products.

Summer and early Fall will bring no letup. Within the next 30 days, it is expected, orders may pile in at an accelerated rate. The WPB ruling permitting the builders to take orders for machines needed on postwar jobs is expected to produce another flurry of business.

Though builders, as long as they have high-priority war plant orders, are not permitted to work on this new postwar business, the ruling will permit them to get much of the preliminary engineering work out of the way. This should materially cut reconversion time in many industries, particularly automobile manufacture.

Even though genuine effort is said to have been made to locate and transfer unused, available machines to meet current war plant demands, the WPB survey has revealed less than 10,000 such units. Few of these, it is said, meet the special purpose requirements demanded in the new war product orders that created much of the current rise in orders.

The suggestion that at least part of the gap between war plant demands for machine tools and the ability of the builders to supply them could be met through better utilization of existing equipment was made originally by the WPB-Machine Tool Industry Advisory Committee.

General Motors Machine Tool Program Hits the Road

DETROIT—First presented to a selected group of machine tool builders meeting here early in May and again late in the month at the National Machine Tool Builders' Association meeting in Cleveland, the General Motors Corporation's machine tool film and analysis of postwar machine tool design requirements is going on the road.

Harold T. Johnson, Director of GM Standards, having revised and shortened his thought-provoking talk and motion picture of machine tool stand-

(Concluded on page 136)

MACHINE TOOL DESIGN AND POSTWAR REQUIREMENTS

●What is the postwar outlook for the machine tool industry? For the interest of TOOL ENGINEER readers, who are buyers and users of machine tools, leaders in the industry have been invited to present their views of this vital question

☆

CHARLES J. STILWELL
PRESIDENT
THE WARNER & SWASEY COMPANY

". . . . Warner & Swasey has undertaken a program of research . . . ."

● Certain trends in thinking related to postwar production are already becoming apparent. Uppermost will be the demand for lowered costs, and higher precision at low cost.

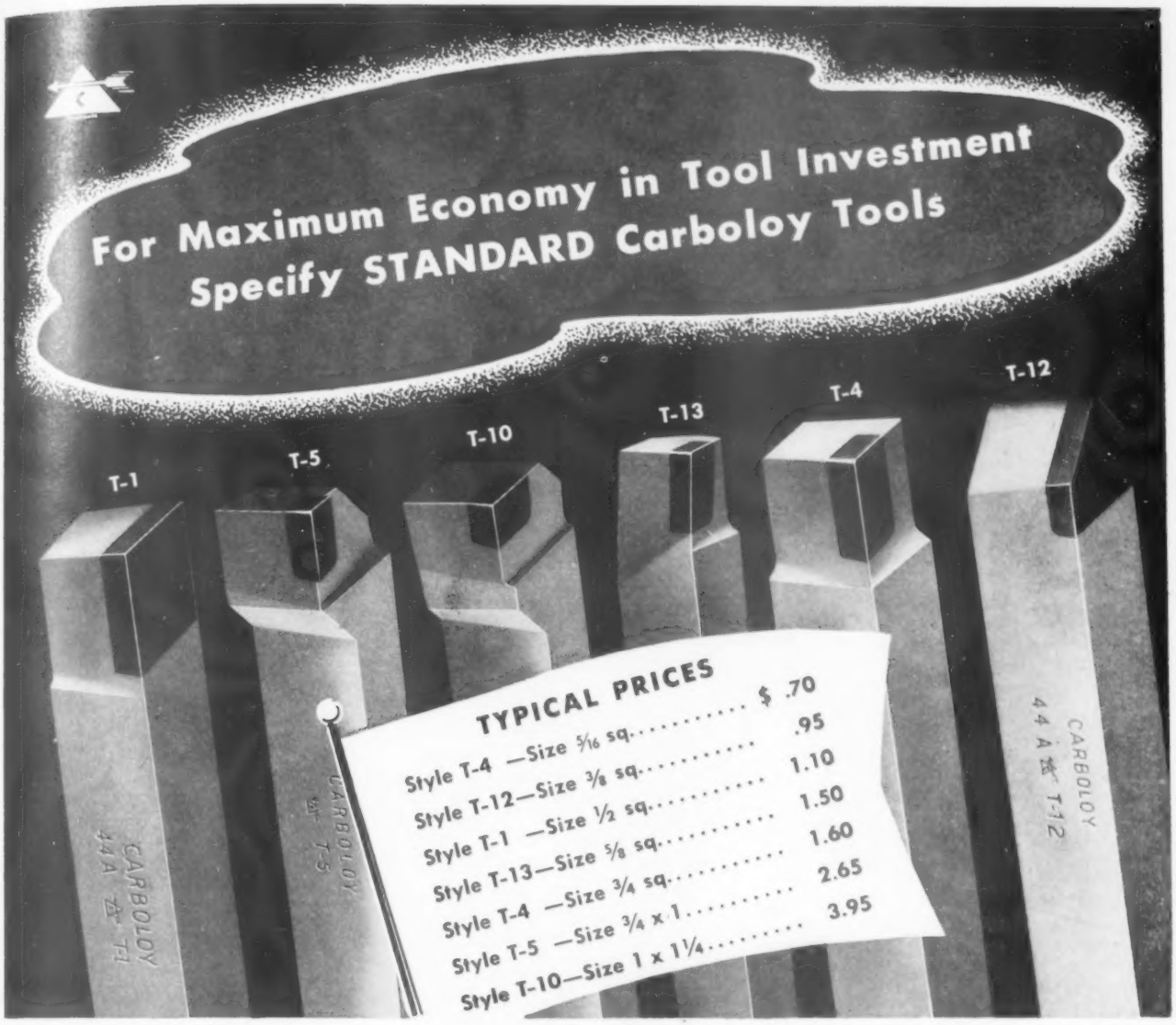
Many of the practices employed in war production will become standardized in the production of peacetime products, but the effect of this cannot be predicted at any specific time. As is always the case, the results of war production will become evident through a development, rather than a sudden explosion, of new techniques.

A readjustment period is inevitable before selling and manufacturing become reoriented with the new order of civilian consumption. During that period, industry will have an opportunity to evaluate the tremendous surplus of machine tools, which will be available, in relation to new developments which may tend to obsolete the surplus stock. Again, the point of determination will be the specific production requirements that will be developed for each manufactured product in relation to its cost and its market. It is quite possible that new machine tool designs, based on developments now known and unrestricted, may easily prove to be obsoleted by the time we emerge from the readjustment period.

To be prepared to meet the postwar needs of the manufacturing industry, whatever they may be, Warner & Swasey has undertaken a program of research covering a broad field. Many of the ideas that have been gathered originate in sources heretofore considered too unrelated to metal working to contribute to its advancement and related techniques.

Many new and significant approaches to problems of metal cutting are developing from this research. The task of coordinating them and incorporating them in new machine tool designs, is tremendous. We are moving forward with the job as rapidly as the war demands upon us will permit, in order that we may be prepared to meet postwar production requirements just as quickly as they may be crystallized.

For Maximum Economy in Tool Investment Specify STANDARD Carboloy Tools



Get maximum economy in tool investment cost, *plus* maximum savings in carbide tool use by specifying *Standard* styles of Carboloy Tools. Available in 10 styles, a wide range of sizes and 5 grades, Standard Carboloy Tools are designed for general purpose use on 60% to 80% of all your metal cutting applications. Outstanding for cutting steel, as well as cast iron, non-ferrous metal and non-metallics, Standard Carboloy Tools provide high finish, extra-long tool life, close tolerances, and are applicable to the entire range of cutting—from heavy roughing to light finishing. Write for catalog GT-175.

STYLES T-4, T-5-10-13 also available left hand

●

SEND FOR CATALOG GT-175

CARBOLOY COMPANY, INC.

11145 E. 8 Mile Street, Detroit 32, Michigan

BIRMINGHAM • CHICAGO • CLEVELAND • LOS ANGELES • NEWARK • PHILADELPHIA
PITTSBURGH • SEATTLE • THOMASTON, CONN.

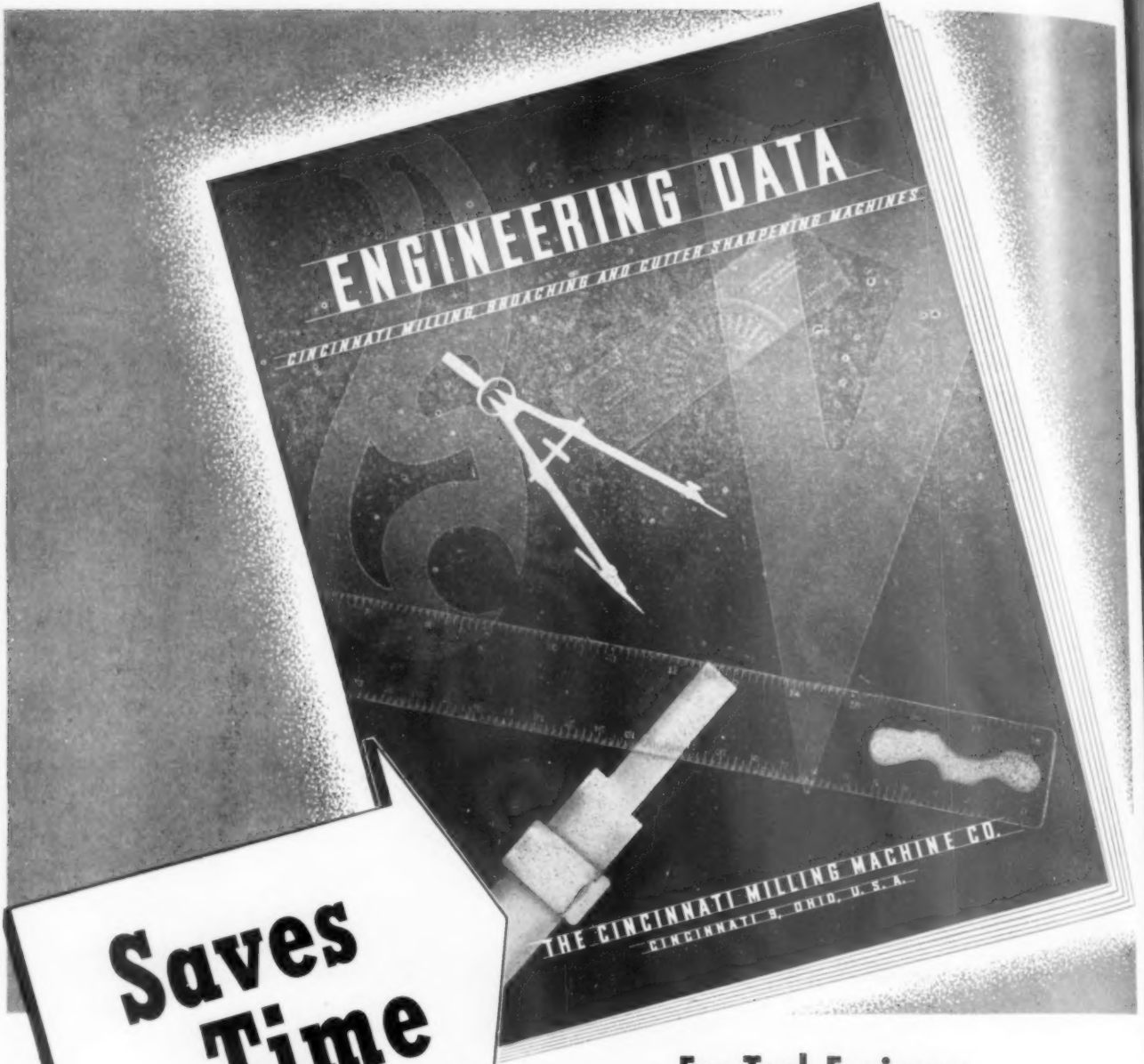
Also sold by 25 leading Mill Supply Distributors

CARBOLOY

For Cutting CAST IRON and Non-Ferrous Metals

For Cutting STEEL

TUNGSTEN CARBIDES ★★★ TUNGSTEN CARBIDES WITH TANTALUM AND/OR TITANIUM CARBIDES


ENGINEERING DATA
CINCINNATI MILLING, BROACHING AND CUTTER SHARPENING MACHINES
THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO, U. S. A.

Saves Time

For Tool Engineers, Plant Layout Men, Methods Engineers

How many times do you find it necessary to go out in the shop and check machine dimensions when you are working on fixtures? And when the machine is in a shop miles away, days and sometimes weeks are required to obtain the desired dimensions by mail. Now, if you are working with current models of CINCINNATI Milling, Broaching, and Cutter Sharpening Machines, you may obtain all the pertinent engineering information in one catalog weighing a few ounces.

Engineering Data Catalog, M-1322, is published by The Cincinnati Milling Machine Co. for tool engineers, plant layout men, methods engineers, and others interested only in engineering data. It saves paper, too, for all descriptive text has been eliminated.

Use this engineering data catalog wherever you can. You may obtain a copy of it by writing to the address given below. Of course, if you are interested in all the design highlights of CINCINNATI Milling, Grinding, Broaching, Lapping and Cutter Sharpening Machines, write for a copy of the General Catalog.

CINCINNATI

THE CINCINNATI MILLING MACHINE CO. CINCINNATI, 9 OHIO, U.S.A.

TOOL ROOM AND MANUFACTURING MILLING MACHINES... SURFACE BROACHING MACHINES... CUTTER SHARPENING MACHINES

INDUSTRIAL NEWS DIGEST

. . . a review of significant developments and new techniques in mass production industries . . .

Five Societies to Participate in Cleveland Metal Congress

CLEVELAND—Two additional technical societies will participate in the forthcoming National Metal Congress and War Conference Displays, to be held here in the Public Hall the week of October 16.

New Metal Congress participants are the Society for Experimental Stress Analysis and the American Industrial Radium and X-Ray Society. Other groups holding meetings planned in conjunction with the annual Congress are the American Society for Metals, sponsor of the 26-year-old event, the Iron and Steel Institute of Metals divisions of the American Institute of Mining and Metallurgical Engineers, and the American Welding Society.

More than 150 research papers will be presented, according to W. H. Eisenman, national secretary of the American Society for Metals and managing director of the Congress. "Nearly a thousand men are collaborating in the preparation of this year's program," Eisenman said, stating that "all branches of the metal industry are represented in these five societies."

The Society for Experimental Stress Analysis has national headquarters at the Massachusetts Institute of Technology, with Professor W. M. Murray of M. I. T. as president. Members of the executive committee are M. Hetenyi, Westinghouse Electric and Manufacturing Company; C. Lipson, Chrysler Corporation; and R. D. Mindlin, Columbia University. Cleveland headquarters of the Society during the Congress will be the Carter Hotel.

The American Industrial Radium and X-Ray Society convention headquarters will be at Hotel Hollenden. Its technical program is under the direction of Roy W. Emerson, metallurgist, Pittsburgh Piping and Equipment Company. M. B. Evans, Ternstedt Manufacturing Division, General Motors Corporation, is president; P. D. Johnson is secretary, with national headquarters at 25 East Washington Street, Chicago.

Congress headquarters of The American Society for Metals will be at both Statler and Hollenden hotels; the A. I. M. E. will be at the Statler, and the American Welding Society at Hotel Cleveland.

AGMA Announces Increase in Volume of Gear Sales

PITTSBURGH—Gear production and sales maintained a steady pace during the late spring, according to figures compiled by the American Gear Manufacturers Association.

The gearing industry, as represented by members of the AGMA, showed a slight increase in volume of sales for May, 1944, as compared with the previous month. The rise of three-fourths of one per cent did not include turbine or propulsion gearing.

The AGMA index figure for May stood at 305.

Pressed Metal Institute Elects New Officers

PHILADELPHIA—F. C. Greenhill, Vice President of the Acklin Stamping Company, Toledo was elected President of the Pressed Metal Institute at a meeting here June 21. Retiring Institute President was G. E. Whitlock, President, Mullins Manufacturing Company, Salem, Ohio.

J. H. Robins, President, the American Pulley Company, Philadelphia, was named First Vice President of the Institute, and T. J. Smith, Jr., Cleveland and Huntington, W. Va., was appointed Executive Vice President.

Three new trustees were also qualified: C. W. Custer, The American

(Continued on following page)

HOW BIG IS BIG?

Dramatizing the size of the new Superfortress is this worker atop a ladder inspecting the plane's vertical fin.

● Largest production job and crowning achievement in the history of the aircraft industry is the Army's new B-29 Superfortress.

Designed by Boeing, the giant ship is assembled in five huge plants from parts and sub-assemblies produced in several hundred others. Final assembly is performed by Boeing at Seattle and Renton, Washington, and Wichita, Kansas; by Glenn L. Martin at Omaha; and by Bell Aircraft at Marietta, Georgia.

One of the largest producers of subassemblies is General Motors' Fisher Body Division, Cleveland, where this photo was taken.

Basic B-29 data: Wingspread, 141 feet; length, 100 feet; height, 27 feet; engines, four 2,200 horsepower Wright 18-cylinder radials.

"GREENIE" — *Definitely No Go*

T.M. REG. BY THE BRAMSON PUBLISHING COMPANY

GREENIE— I'VE GOT A NEW JOB FOR YOU— NOW YOURE GOING INTO FLY-CUTTING!
HOLD ON, BOSS— THAT IS CARRYING THINGS TOO FAR! LET'S JUST GET SOME FLY PAPER — THEN THE FLIES CAN TAKE CARE OF THEMSELVES!
RALPH DAVIS

(Continued from preceding page)

Stamping Company, Cleveland, Chairman of the Cleveland district; C. W. Cederberg, Larson Tool & Stamping Company, Attleboro, Massachusetts, Chairman of the New England District, and V. S. Morrison, Morrison Steel Products, Buffalo, Chairman of the New York State district. District Chairmen are representatives of their districts by Institute constitutional procedure.

Membership in the 15-month-old Institute, it was pointed out at the meeting, already embraces representative concerns from coast to coast and is growing steadily.

Regular meetings of the nine Institute district groups are being held and greater activity is in progress, including explanations of government regulations, and study of engineering, production, cost accounting and other manufacturing problems. Special attention, Institute officers said, is being given to postwar plans, including surplus materials, competitive materials and methods, as well as new markets.

Ford Produces 10,000th Set of Johansson Gage Blocks

DEARBORN, Mich.—Something of a milestone in the history of the gage industry was passed here last month when the 10,000th set of Johansson gage blocks, consisting of 81 pieces, was presented to Henry Ford.

The motor magnate, whose interest in precision measuring on a mass production basis contributed much to the perfection of these delicate instruments, was a long-time friend of famed Carl Edvard Johansson.

Up to Pearl Harbor, approximately 4,500 sets of blocks and their accessories had been manufactured at the Dearborn Engineering Laboratory of the Ford Motor Company. Since then, Jo-Block production has skyrocketed; more than 5,500 sets and blocks have been made in the last three years.

A. G. Bryant Named Advisor on Machine Tools to RFC

WASHINGTON — Facing the tremendous task of handling the problems involved in disposing of an overwhelming per cent of the nation's excess war-built machine tools, the Reconstruction Finance Corporation is seeking sound advice.

To assist it in this work, the government agency has named as its advisor A. G. Bryant, Vice President, Cleereman Machine Tool Company.

Bryant, who is one of the most progressive and vocal leaders in the industry, also is chairman of the government relations committee, National Machine Tool Builders Association.

Clinic Sets November 2-3 for Time and Motion Study

CHICAGO—The eighth annual National Time and Motion Study Clinic, sponsored by the Industrial Management Society, will be held here November 2 and 3.

Planned for engineers, executives and supervisors in mass production industry, the clinic theme will be "More Production with Less Effort." Attendance at the last meeting is reported to have totaled 1,200 persons.

Critical Situation Prevails in Screw Machine Products

WASHINGTON—Shortages in key personnel and a loss of approximately 20 per cent in the total number of workers are seriously affecting the screw machine products industry.

The industry currently faces an average of six month's backlog of unfilled orders due chiefly to loss of screw operators, tool makers, inspectors, tube and shaft machine and automatic machine operators and setup men.

Serious as conditions are in the industry today, they may be worse in months to come. The current farm machinery and truck-trailer programs are increasing requirements for screw machine products, the WPB-Industry committee was told here recently.

Metal-Cutting Featured at ASME Semi-Annual Meeting

PITTSBURGH — With a technical program devoted largely to metals and metal-cutting, the American Society of Mechanical Engineers held their 1944 semi-annual meeting at the Hotel William Penn, June 19-22.

In the field of machining, J. Q. Holmes, Master Mechanic, Eastern Aircraft Division, General Motors, discussed the use of negative rake tools in the production of aircraft parts. His analysis was based on the use of this technique in tooling turret lathes, milling machines and precision boring machines.

Two Kearney & Trecker Corporation men, A. O. Schmidt, research engineer, and J. B. Armitage, Vice President in charge of engineering, presented papers on the thermo-analysis of tool forces in high-speed milling and the effect of radial rake angles in face milling.

Machinability of steel in relation to yield stress ratios was described by E. J. Janitsky, consulting mechanical engineer, Carnegie-Illinois Steel Company; while S. M. DePoy, metallurgist, Delco Products Division, General Motors, explained the effect of sub-zero treatment on the productivity of four high-speed steels.

Light metals received attention at the meeting, with M. A. Miller, Jr., process metallurgist, E. C. Hartman, chief, Engineering Design Division, and G. O. Hoglund, Jobbing Division,

(Continued on page 118)

● Deserving much credit for the victory we have achieved on the production front, the gage industry should assume a new and more important place in peacetime metal-working. Here is another in The Tool Engineer magazine's series on the postwar outlook in metal-working, this month by a prominent gage manufacturer.

GAGING IS NO LUXURY

☆

RAY W. RICE
GENERAL MANAGER
QUALITY TOOL & DIE COMPANY

THE WAR has taught us one important lesson: Gaging is no luxury, but a necessary insurance.

The high precision vital in weapons used for modern warfare has made yesterday's inspection methods obsolete. Too many lives are at stake to permit slip-shod work to get through.

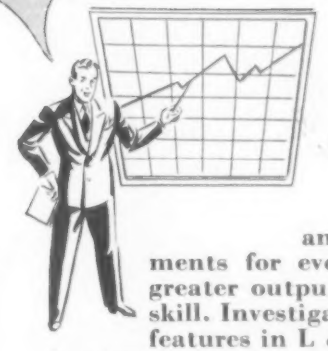
When peace comes, and lives no longer depend on products made to super-fine tolerances, will this painstaking exactness be abandoned for the old "spot inspection" methods where hand tools and human judgment often combined to permit tolerances "close enough" to escape detection?

Yes, possibly, by a few short-sighted manufacturers. But certainly not by those wanting every advantage possible in the postwar scramble for business. Those thousands of companies which have won the esteem of the nation will not want to risk it by returning to prewar standards. For industry has learned that efficient gaging methods pay.

Costly scrap is prevented at the source of production. Interchangeability of parts, a requisite to mass production, is assured by a production line which cannot step beyond engineering specifications. Final assembly problems are greatly reduced and the end product is a superior one of which the manufacturer justly can be proud — and for which he can expect more orders.

With such demonstrated effectiveness, the postwar outlook for the gaging industry is excellent.

"Costs are greater today though we're making the same pre-war products. With these new L & S Lathes our manufacturing costs are kept in line."



WAGES have always been a major factor in production costs. More recently, new forms of taxation—plus additional clerical and accounting expenses imposed by legislation—have added heavily to the burden on production. From all indications, these high costs will prevail long after the war's end. Therefore, to keep manufacturing costs low—now and later—greater output per worker must be obtained, new, more efficient machinery must be utilized.

No matter what products you're making now—whether they're new or prewar—it will pay you to learn about the economies you can effect with up-to-date L & S Lathes. Every element needed to obtain favorable production costs is available in these modern machines. Automatic devices and manufacturing attachments for every type of work assure greater output with far less operating skill. Investigate these and many other features in L & S Lathes. To keep production moving up, costs moving down, Lodge & Shipley Engineers are always at your service.

PREPARE FOR THE COMING BATTLE OF MARKETS!

Competitive conditions in your field may be greatly changed when the time comes for reconversion. But one thing is sure—high cost producers won't make the grade. For a better product, at lowest possible cost, be sure to use the newest developments in machine tool design. But don't wait until the day of re-conversion to plan. Call in Lodge & Shipley Engineers now to study your future lathe requirements.

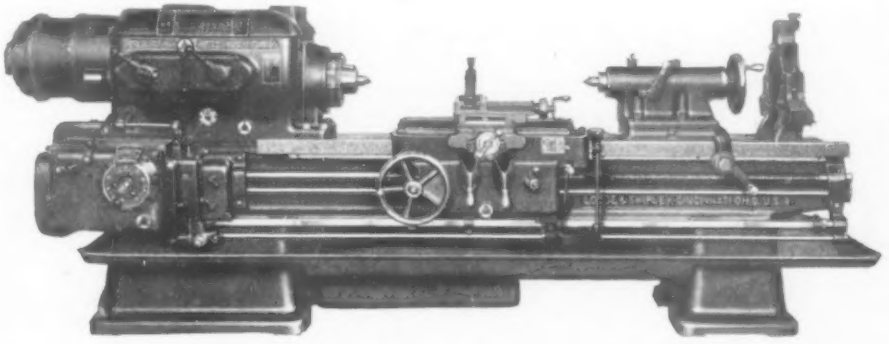


Illustration shows the 20" Selective Head Tool Room Lathe, designed to provide many years of highest quality precision work, and to furnish greater output at lower cost per piece. L & S Tool Room Lathes are available in a number of sizes to meet your special requirements. Write for Bulletin No. 508-BO.

ENGINE
AUTOMATIC
TOOL ROOM
OIL COUNTRY
LATHES

THE LODGE & SHIPLEY MACHINE TOOL CO.

CINCINNATI 25, OHIO, U. S. A.

L & S LATHES

PRODUCTION - TOOL ROOM - MAINTENANCE

A Simple low-cost answer to metal sawing problems

SAVE TIME AND LABOR by placing a Wells Saw wherever you have metal to cut—production line, tool room, repair shop or other departments. The Wells is such a low cost, versatile saw, there is no need to tie up large special production units on odd jobs—or to waste time and labor transporting metal to a saw (the Wells is easy to move to the job.)

Why not see your supply man for complete details and a demonstration—it will be worthwhile.

Wells SAWS

Wells

Products by Wells are Practical

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION
1212 MONROE ST., THREE RIVERS, MICHIGAN

(Continued from page 116)

Aluminum Company of America, contributed papers on improved methods of joining aluminum. Among the procedures described were riveting, soldering, welding, brazing and resin bonding.

Kirby F. Thornton, also from the Aluminum Company, described stepped extrusions for aircraft as a means of saving material and machine time.

WPB Predicts Drop in Measuring and Testing Machine Shipments

WASHINGTON—Monthly shipments of precision measuring and testing machines, instruments, and tools at the end of 1943 were at approximately the same level as at the beginning of the year, after a slight rise in the second and third quarters.

Unfilled orders, in general, were greatest in March, but declined sharply to about 60 per cent of the January levels at the end of 1943, the WPB has revealed in an industry analysis.

Shipments at present are substantially in excess of net new orders, and on the basis of the trend of unfilled orders, it is anticipated that shipments will show a drop within a few months.

Precision measuring and testing machines and instruments include comparators, hardness testers, measuring and testing machines, microscopes, gage blocks and micrometers.

Total shipments last year of precision measuring and testing machines and instruments, not including gage blocks and micrometers, were valued at $28,860,000. Unfilled orders at the end of December totaled $6,387,015.

Gage blocks valued at $3,131,220 were shipped during 1943, according to the report. Unfilled orders dropped from $944,736 in January to $407,029 at the end of December.

Micrometers shipped during the year were valued at $10,251,846, it was said, while unfilled orders at the end of December were valued at $2,830,518.

Precision measuring tools, including calipers, gages, indicators, protractors, rules, squares, vernier calipers, and geartooth, height and depth gages, were valued at $29,427,818. Unfilled orders at the end of the year amounted to $8,157,538.

Tool room specialties shipped were valued at $6,344,049; and a backlog of $906,965 was reported. Tool room specialties include measuring wires, levels, angle irons, plates and sine bars.

AIRCRAFT PRODUCTION

Auto Builder Promises Postwar Use for Willow Run Plant

DEARBORN, MICH.—When Henry Ford announced he would build a bomber an hour many a wiseacre laughed. Now, the motor pioneer's much maligned Willow Run is one of the nation's wonder plants, is producing the promised bomber an hour.

More than that, the big aircraft factory on the flatlands of southeastern

(Continued on page 120)

Save VALUABLE TOOLS

THE SIMPLE, RELIABLE LOW-COST

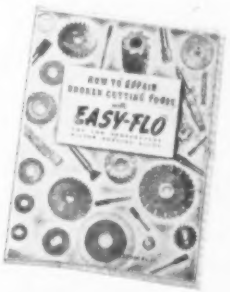
EASY-FLO WAY

The thousands of EASY-FLO users know that brazing with this low-temperature, free-flowing, fast-acting silver alloy is simple, reliable and economical.

That this is also true for the repair of broken cutting tools with EASY-FLO has now been proved by wide-scale experience in broken broaches, milling cutters, forming tools, dies, band and circular saws and numerous other tools.

THIS BULLETIN GIVES YOU THE FACTS

The end mill illustrated is one of many examples taken from ***Bulletin No. 14*** which tells you in detail how to repair broken cutting tools with EASY-FLO. If you are in any way responsible for production, this bulletin is important to you because it points the way to getting broken tools back to work quick, avoiding long replacement delays and saving many dollars in tool costs.



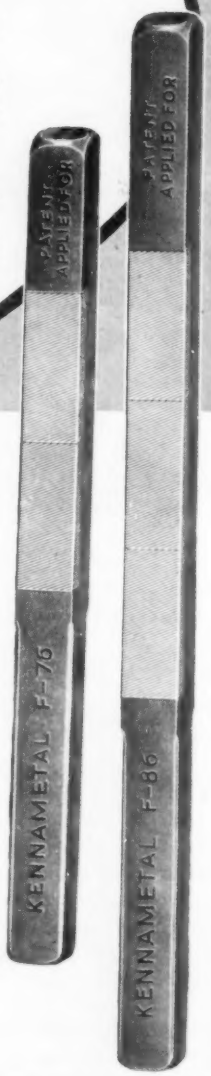
Your copy of Bulletin No. 14 will be mailed on request. Write for it today.

HANDY & HARMAN

82 FULTON ST., NEW YORK 7, N.Y.

KENNAMETAL *Lathe File Does as Much Work as 150 Mill Cut Files*

...AND PRODUCES A BETTER FINISH!



Comparative service tests continue to prove convincingly that Kennametal lathe files multiply production, improve quality of work, and effect substantial savings in the cost of files used. For example, on the job illustrated above:

A mill cut steel file, employed to remove the sharp edges from the 400 Brinell steel part, wore out on about 100 pieces. A Kennametal file turned out 800 pieces the first day—stayed on the job two weeks—and produced 15,000 pieces. The Kennametal file cut a curling chip—did not scrape or skid—and provided a finish that was almost as smooth as a grinding job!

Kennametal lathe files outlast steel files 50 to 200 times, because their surface is made of the same hard, cemented carbide composition as steel-cutting Kennametal-tipped tools. They permit filing speeds 3 to 10 times those possible with steel files—doing an outstanding job on cast iron and brass at surface speeds around 900 feet per minute, and on high-carbon, high-chromium steels at 800 surface feet per minute. The keen, sturdy teeth of a Kennametal file will make a clean, true cut on steels up to 62 Rockwell C, a hardness that ordinary files cannot touch.

The value of any tool is measured by the quality and quantity of work it produces. The higher original cost of Kennametal lathe files is insignificant compared to the tremendous economies effected through their use. Order one today for test purposes—let it prove its merit in your shop.

Kennametal Lathe Files are now furnished in two sizes—11" or 14" long—and each size is available with either 20 or 30 teeth per inch. The 11" size (F-76, 30 teeth/inch; F-77, 20 teeth/inch) having a filing surface 4" long x ¾" wide, costs $12.50. The 14" size (F-86, 30 teeth/inch; F-87, 20 teeth/inch) having a filing surface 6" long x ¾" wide, costs $18.50. All sizes can be shipped promptly.

KENNAMETAL
SUPERIOR CEMENTED CARBIDES
KENNAMETAL Inc., LATROBE, PA.

INDUSTRIAL NEWS DIGEST

(Continued from page 118)

Michigan has built more than 5,000 big four-engine ships, half of them since January of this year. Interesting to critical production men is the fact that the plant is doing the job with 30,000 workers, 12,000 fewer than were employed there a year ago. Today, it is the only plant in the country still producing the original Consolidated B-24 design.

Last month Willow Run again made current and postwar production news. The plant was originally designed to complete 50 per cent fly-away planes, and 50 per cent knocked-down units for shipment by truck to Tulsa, Oklahoma, and Fort Worth, Texas, where they were assembled. Ahead of production schedules for the 10th consecutive month, Willow Run today is completing for fly-away 100 per cent of its production. No drop in output was suffered during the transition, according to Ford engineers.

The last B-24 knock-down set was shipped by truck July 7, making a total of 1,900 bombers shipped to other assembly plants. Shipments of Ford-built knock-downs reached a peak last January, when 178 were hauled away by truck. Since then the fly-away production has increased ahead of schedule and the number of components has been reduced.

A fleet of 83 huge truck-trailers was used to haul the 80 per cent complete bombers westward. Five of the vans were needed to ship two complete planes.

Late last month Washington rumormongers had Willow Run scheduled as a postwar warehouse for excess war production materiel. Eighty-one year old Henry Ford's personal Capital correspondent, crack ex-newsman Clifford Prevost, picked up the story, notified Dearborn. Ford was quick to brand it a lie, announce "plans to manufacture some product at Willow Run" after the war.

"If we understand our contract with the Government correctly we have first option on purchasing Willow Run after the war," the company said.

"It is our plan to manufacture some product at Willow Run. It may be planes of the cargo or passenger type, if we can get a design which is economical and safe enough. It may be tractors and other farm equipment.

"We feel the plant is worthy and capable of much more essential operation after the war than as a storage center."

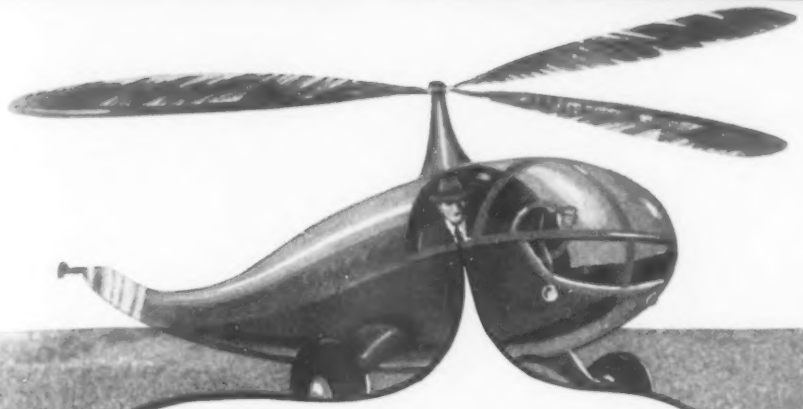
Meanwhile, Detroit is anxiously awaiting the next installment of "What about Willow Run?"

MATERIALS

Metal Technologist Predicts Greater Use of Heavy Metals

COLUMBUS, OHIO—Offering his opinion on the postwar "battle of materials", the Battelle Institute's noted metal technologist, John D. Sullivan, believes neither plastics nor the light metals will markedly affect the con-

(Continued on page 122)



YOU WOULDN'T BELIEVE IT BUT THIS CORNFIELD WAS ONCE A WAR PLANT.

THE PLANTS THAT HAVE BETTER TOOLS WILL NOT GO BACK TO CORNFIELDS

No matter what the post-war national income may be, the plants with better products and lower costs will not go back to cornfields. Because nobody can buy materials or labor much cheaper than his competitors, the only remaining way to lower costs is to cut them with better plant layout and special time saving tools.

Vulcan production engineering, tool designing and building service can be of great help to those who want their vision of post-war tools converted into blue prints — perhaps into metal — *before* competition gets a head start.

Write for the Vulcan brochure on "Post-War Economy" illustrated here; and let's get acquainted now.

The VULCAN TOOL Co.

213 NORTH BECKEL STREET DAYTON 3 OHIO

ENGINEERING · DESIGNING · BUILDING · GAUGES · TOOLS · DIES · JIGS · SPECIAL MACHINERY

MEMORANDUM

How to get longest blade life and shortest down-time with McCrosky Inserted-Blade Cutting Tools

Practical Manuals on How to Get Most from the Time-Saving, Cost-Cutting Features of McCrosky Tools

McCROSKY BORING BAR MANUAL covers the design and use of McCROSKY Adjustable Block Boring Bars. It includes detailed instructions with diagrams on changing blocks in bar, controlling float for finishing cuts, adjusting blades and regrinding, speeds and feeds.

McCROSKY REAMER MANUAL is primarily planned for users of McCROSKY SUPER Adjustable Reamers, but much information is applicable to all types of reamers. It contains instructions on blade adjustment, grinds for reaming different types of metals, and speeds and feeds.

McCROSKY MILLING CUTTER MANUAL gives detailed instructions on how the blade-locking wedge and the blade-adjusting screw in McCROSKY JACK-LOCK Cutters can be used to shorten down-time and reduce to a minimum the amount of blade stock sacrificed in regrinding. Other topics applicable to all types of milling cutters: mounting of cutters, speeds and feeds, basic grinds, action of cutting fluids, cutter care.

Send for McCrosky Manuals by titles, stating your job or department.

For further information, write to **McCROSKY, Meadville, Pa.**

EST 1904 McCROSKY TOOL CORPORATION MEADVILLE, PA.

Super Adjustable Reamers • Jack-Lock Milling Cutters
Wizard Quick-Change Chucks • Adjustable Block Boring
Bars • Turret Tool Posts • Special-Purpose Tools

(Continued from page 120)

sumption of the "old-line" heavy metals.

Sullivan declares that the fear of the heavy metals industries of ruinous competition from the war-expanded plastics and light metals industries is needless. On the contrary, he says, increased demands for steel, copper, lead, zinc and tin may reasonably be expected.

"Many metal-conscious people feel that with the vastly increased production of aluminum, magnesium, plastics and glass, that the old-line metals, such as copper, zinc, lead, and even steel, are bound to suffer", the Battelle metals expert states.

"The future can be viewed only in the light of the experience of the past, plus the likelihood of new developments resulting from research and from geological and mining explorations. An analysis of the past can lead to only one conclusion—that our over-all consumption of metals is so great and the demand will increase so markedly after the war that to satisfy human wants the demand for virtually all of the basic metals will increase."

The demand for civilian goods which has been unsatisfied during the war is viewed by Sullivan as presaging an inevitable impetus to heavy metals consumption.

Even though the country's plastics and light metals industries have increased many fold since the beginning of the war, the Battelle expert explains that the production tonnages were small when compared with the tonnages of heavy metals.

"When production levels off in 1944," he says, "we shall have in the United States the capacity to produce about 110,000,000 tons of basic metallic and nonmetallic engineering products, and of this amount steel will be about 85 per cent of the total. Aluminum and magnesium combined will account for 1.3 per cent; lead and zinc, 1.8 per cent; plywood and synthetic rubber, slightly under 1 per cent each; glass, about 6 to 8 per cent; and plastics about 0.2 per cent."

"V-Day" Exhibit Planned by Plastics Industry Society

NEW YORK—Contemplating the inevitable postwar struggle for markets, the Society of the Plastics Industry is currently planning a "V-Day Exhibition" to acquaint the public and industry with the new materials that have been developed during the war.

George Scribner, president of the Society, has announced that the show will be industry-supported. As a forerunner of annual shows, it will be held in New York or Chicago, he said.

Show plans call for display of present plastic product applications which are now secret due to war production security rules, as well as new applications being developed.

It is believed that the display will include machinery and plastic plant equipment for the interest of the industry itself.

(Continued on page 126)

OILGEAR

Giant rubber-pad Airplane press uses Oilgear Fluid Power for all motions. Tables travel up to 3 feet per second yet accelerate and decelerate without jar. All functions together with selective sequence obtained simply with standard equipment. Tables can be brought under press as loaded. No waiting, no delay. Proved dependable trouble-free performance.

ARE YOU TRYING TO:

1. Apply large forces through long . . . or short . . . strokes at variable speeds?
2. Obtain automatic work cycles, variable speeds in either direction . . . with or without pre-set time dwell?
3. Apply large forces through continuous or intermittent reciprocating cycles at constant or variable velocities?
4. Obtain extremely accurate control of either position or speed of a reciprocating member?
5. Apply accurately variable pressure either static or in motion?
6. Closely synchronize various motions, operations or functions?
7. Apply light . . . or heavy . . . forces at extremely high velocities through either long or short distances of travel?
8. Obtain continuous automatic reversing drives at constant R.P.M. or over a wide range of speed variation?
9. Obtain accurate remote control of speed and direction of rotation, rates of acceleration and/or deceleration?
10. Obtain constant horsepower output through all or part of a speed range?
11. Obtain automatic torque control?
12. Obtain accurately matched speed of various rotating elements?
13. Obtain constant speed output from a variable speed input?
14. Obtain full pre-set automatic control, elimination of problems of shock, vibration, etc.?

You Need Oilgear!

AND STEP UP PRODUCTION

Oilgear helps designers to get full press production capacity

Plane part plant after plane part plant is converting to these new Oilgear-powered 2½-, 3-, and 5-thousand-ton presses . . . selective or sequence loading and feeding on the 4-way shuttle tables are cutting down press non-productive time and boosting output tremendously. Oilgear's role is to provide the flexible, controllable power that makes such operations possible.

Sheet metal to be formed and dies are set up on table unsecured, the table accelerates smoothly so as not to disturb the set-up, travels as high as 3 feet per second, decelerates without jar under the rubber-pad press, and, after the forming operation, withdraws, its place taken by another loaded table. All operations are controlled automatically and remotely. Yet sequence can be varied at will to let tables feed under the press as fast as they are loaded, and all functions are obtained with simple, standard Oilgear equipment.

Flexible, versatile, adaptable Oilgear Fluid Power offers many other advantages too, all of them applicable to giant and midget machines alike. Forward-looking builders and users of machines and processes cannot afford to overlook these advantages. Find out from Oilgear engineers what Oilgear can do for you. Write today. . . . THE OILGEAR COMPANY, 1308 West Bruce Street, Milwaukee 4, Wisconsin.

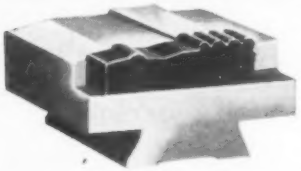
OILGEAR

Fluid Power

OPERATORS ARE TRAINED *Quickly*

TO SECURE ±.0005" ACCURACY *with the* Wickman PROFILE GRINDER

TYPICAL EXAMPLES OF WORK GROUND AND INSPECTED ON THIS MACHINE WITHOUT USE OF RADIUS DRESSER OR FORMED WHEEL



Cemented-Carbide Tipped Form Tool
Width of Carbide Tip . . . . . 1¾"
Stock Removed . . . . . approx. .040"
Grinding time including set-up and complete inspection of contour before removal from machine . . . . . 3½ h

Circular Form Tool with Preformed Cemented-Carbide Tips
Stock Removed . . . . . .015"
Grinding time including set-up and complete inspection before removal from machine
approx. 2 hrs.

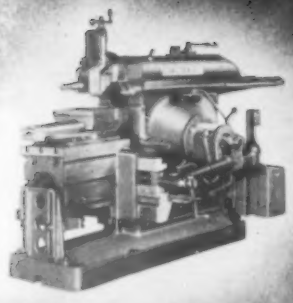
The Wickman Profile Grinder is a machine which makes possible substantial savings in machining time. It produces extremely accurate work, tolerances even closer than ± .0005" being secured with reasonable care in operation.

Of most importance, these production advantages can be effected in your plant with relatively unskilled operators assigned to the machines. Any person of average intelligence can be trained in a very short time to become thoroughly efficient in the Wickman method of profile grinding.

The layout and brain-work are done in the drafting room. The operator has nothing to measure. She sees it done. She knows at all times where every point on the contour is, during its development, in relation to every other point on the tool without removing it from the machine for partial inspection. Write for completely descriptive literature.

BUY MORE—*AND MORE*—WAR BONDS

THE Wickman CORPORATION
15535 WOODROW WILSON AVE.
DETROIT 3, MICHIGAN



CONTOURING

... another Function of the Shaper

WHILE the Shaper is indispensable in the toolroom, it is also very much at home in manufacturing shops.

In your shop there may be jobs, involving the principle of contouring, that are best performed on a Shaper.

Cincinnati Shapers are accurate . . . responsive . . . profitable.

Write for Catalog N-2.

THE CINCINNATI SHAPER CO.

CINCINNATI OHIO U.S.A.

SHAPERS BRAKES SHEARS

Reduced Rejections Reduce Costs!

SPEED CASE STEEL

A LOW CARBON OPEN HEARTH PRODUCT..

IMPROVED QUALITY

- Rivets Without Fracture
- Smooth Finished Parts
- Increased Machinability

Excellent Ductility

This hub, for a V Type Metal Pulley, was machined faster than Bessemer B 1112 Steel. The flange for holding the stampings was riveted over without any sign of fracture.

Speed Case replaced X 1314 and increased production at least 25%.

Estimated savings per ton of Speed Case used were $41.35.

Write for SPEED CASE CATALOG showing savings of 20 to 65%.

If you wrote your own specifications for *the ideal*, all purpose, open hearth carburizing STEEL, it would be . . . SPEED CASE!

BUY WAR BONDS

Licensor

MONARCH STEEL COMPANY

HAMMOND · INDIANAPOLIS · CHICAGO

Licensee for Eastern States

THE FITZSIMONS COMPANY

YOUNGSTOWN, OHIO

PECKOVER'S LTD. Toronto Canadian Distributor

MANUFACTURERS OF COLD FINISHED CARBON AND ALLOY STEEL BARS

(Continued from page 122)

INDUSTRIAL BUSINESS NOTES

News of Industry Expansions, Services, and Activities

Distributor: Pacific Metals Company, Ltd., has been appointed distributor in California, Nevada, and Arizona for electrodes, welders, and other welding equipment made by A. O. Smith Corporation. Pacific Metals will carry substantial stocks in San Francisco and Los Angeles.

* *

Safety: The overall accident rate at Westinghouse Electric and Manufacturing Company was cut five per cent last year, despite employment of thousands of new, inexperienced workers, the company reports.

Success of the safety campaign, instituted when greatly expanded operations brought an employment increase of 17,000 new workers, many of them women and inexperienced men, is credited to education, increased precautionary measures, and new ways of performing industrial jobs.

AIR CONDITIONING PERMITS WOMEN ON FOUNDRY JOBS

TETERBORO, N. J.—Use of air conditioning by the Eclipse-Pioneer Division of Bendix Aviation Corporation has enabled the employment of women workers for the first time on hundreds of foundry jobs.

"Iron lungs", capable of inhaling 30,000 to 45,000 cubic feet of air per minute, are being used to remove smoke and dust from metal pouring operations in the magnesium and other non ferrous metal casting plants operated by the corporation.

● As a result of the utilization of air conditioning and the mechanization of many light metal-casting operations to eliminate manual jobs, hundreds of women are now employed in the concern's five New Jersey foundries.

Now, more than 30 per cent of the workers in Bendix foundries are women, trained since war started.

Tangible proof of the Westinghouse safety program's success is the recent awarding of the National Safety Security Award by the U. S. Office of Civilian Defense to the company's gear-manufacturing Nuttal Works, for developing against avoidable accidents, fire, sabotage, enemy air raids.

* *

Minneapolis: Production for war has led numerous concerns into the metal fabricating field for the first time. Come peace, most such concerns will close their new machine shops, return to their prewar business. A few will continue in metal working, and enter the battle for postwar survival.

Notable among the latter is General Mills, Incorporated, giant mid-west

(Continued on page 128)

It's no go, Tojo!

BRING on your Bombers, your Destroyers, your Cruisers and Battleships . . . they'll all look alike at the bottom of the sea!

And incidentally, WHERE *IS* YOUR FLEET?

Must be you've heard about the accuracy of our Yankee sailors. Their guns speak a lingo even you can understand.

DON'T COUNT ON A LUCKY BREAK like one of those guns failing in an emergency, because the men of Uncle Sam's Navy don't take chances. EVERY SHELL IS GAGED to make sure it fits perfectly in the gun for which it was made.

We, at the Quality Tool & Die Company, know because we make the inspection gages that provide this insurance. So take it from us: IT'S NO GO, TOJO!

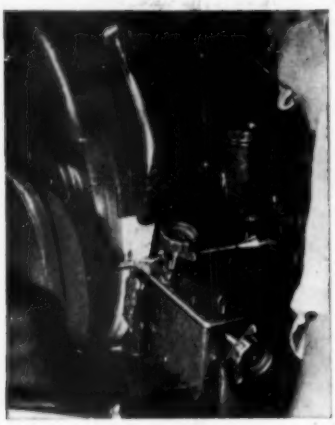
* * *

Keep on Buying War Bonds

QUALITY TOOL & DIE CO

Manufacturers of "Quality" Products

401-15 NORTH NOBLE STREET, INDIANAPOLIS 2, INDIANA



★

HOW MANY PIECES BEFORE REDRESSING?

The Profilometer Gives the Answer!

It is possible, through use of the Profilometer, to schedule a dressing of the wheel following the production of a specified number of parts in any individual grinding setup.

In production grinding of parts, much depends on the proper dressing of the wheel:

- correct surface finish
- maintenance of accurate dimensions
- cutting down grinding time per part
- steady production on final finishing operations.

Because of the many variables in every grinding setup — condition of machine, material, grain and grade of wheel, etc. — it is difficult to determine exactly how many pieces can be ground for each dressing of the wheel — difficult, that is, without the Profilometer.

★

A definite solution to this problem is provided by taking Profilometer readings of parts as they come from the grinder. As the wheel wears, the changes in its performance are reflected in the Profilometer readings.

Use of the Profilometer for this purpose has shown that in any particular setup, the number of parts produced per dressing of the wheel remains practically constant.

Profilometer Has Wide Range of Uses . . .

The brief description above outlines but one of the many ways in which manhours, materials, and money may be saved through use of the Profilometer in measuring average surface roughness.

For more information on surface roughness and the Profilometer equipment for measuring it, write for the booklet *Practical Surface-Roughness Measurement*, mentioning this magazine.

PHYSICISTS RESEARCH COMPANY

343 SOUTH MAIN STREET · ANN ARBOR, MICHIGAN

INDUSTRIAL NEWS DIGEST

(Continued from page 126)

flour miller and food producer. Potentially boosting the Minnesota city's role as a postwar manufacturing center, General Mills has announced the establishment of its war-born Mechanical Division as a full-fledged operating division.

The new Division will engage in the production of precision devices for industrial customers and will also design, manufacture and distribute other mechanical products under the company's name, according to Harry A. Bullis, General Mills President.

With two plants embracing more than 350,000 feet of floor space and with 1,500 employees, the Mechanical Division is at present producing high precision ordnance materiel.

The Minneapolis concern has promised soon to tell "the story of the development of the Mechanical Division from a small machine shop and engineering department to what has been called one of the finest machine shops in the United States. This story of industrial evolution will also answer the question of how and why a flour miller gets into the mechanical manufacturing field."

Since 1940, the Division's ordnance production has included torpedo directors, gunsights and other secret control devices.

* *

New Offices: Three new branch sales offices at Buffalo, St. Louis and San Francisco have been opened by the Carborundum Company.

Charles Knupfer, Vice President in Charge of Sales, also announced the appointment of three new District Sales Managers: G. S. Rogers at Buffalo; Gordon O. Watson at St. Louis; and W. T. McCargo at San Francisco.

* *

Acquisition: The Pennsylvania Lawn Mower Works, Incorporated, Primos, Pennsylvania, founded in 1877, has been acquired by American Chain & Cable Company, Bridgeport, Connecticut.

The Quaker State concern manufactured Pennsylvania Junior, Great American and other brands of a large line of lawn mowers.

* *

West Coast Plant: To improve delivery and technical advisory service in the West, Ampco Metal, Incorporated, Milwaukee, has built a new plant at Burbank, California.

The company's West Coast activities are now concentrated at the Burbank works. Personnel of Ampco's previous Western manufacturing facilities, the Hollywood Aluminum Products Division of Ampco Metal, have moved to Burbank. Works Manager is E. H. Wilson; Plant Superintendent, P. P. Bergmann; Field Service Engineer, O. D. Cooper, assisted by L. C. Dean.

The new plant, it is said, will produce Ampco Metal by both centrifugal and sand cast process. Extruded and other wrought products now manufactured at Milwaukee will be stocked at Burbank. Ampco Non-Sparking Safety Tools also will be stocked in the California shop.

(Continued on page 130)

How Automotive Process Engineers Save Time in Producing Aircraft Engines

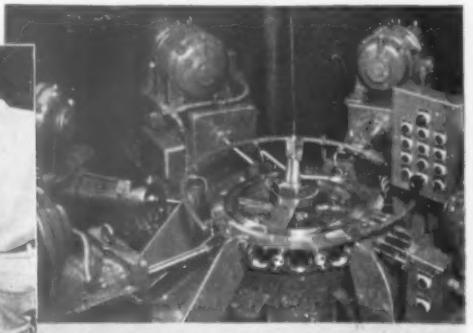
Production Line of Unit-Type Machine Tools Produces More at Less Cost

Here are only six of many W. F. and John Barnes machines producing aircraft engine parts for a prominent automobile manufacturer now producing aircraft engines.

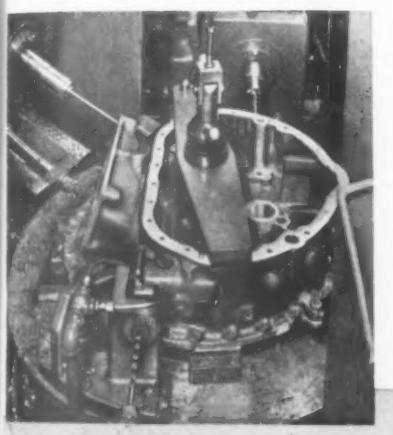
Each machine does more work faster than the machines previously used for the same operations. Each is built from standard hydraulic feed and drive units which can be mounted in any position and easily arranged to accommodate reasonable changes in the design of the workpiece.

This crankcase part was formerly machined in 7 minutes and 54 seconds on conventional drilling equipment. A Barnes 3-way, 3-spindle unit-type machine cuts the machining time to 2 minutes and 6 seconds—saving 5 minutes and 48 seconds. Machine is designed so that it can be used for either step drilling or gun drilling the deep holes.

A Barnes 4-way drilling machine cuts the machining time from 6 to 3 minutes on this airplane engine crankcase. The machine utilizes four drills and an indexing fixture.

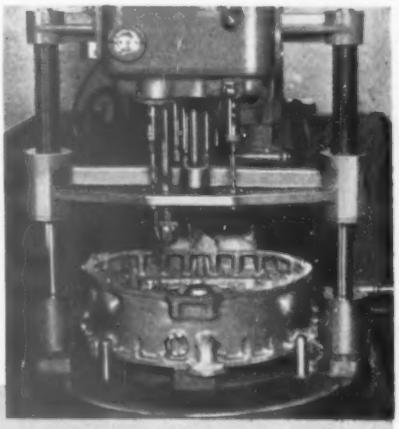


A 6-way unit-type drilling machine with index table which replaced three machines. Machine time has been cut from 15.28 minutes per part to 1.70 minutes—saving 13.58 minutes per piece. In addition to these savings, manpower was saved and handling time decreased because ten spindles work simultaneously instead of three at a time.



This machine performs three drilling operations in one-eighth the former time. Machine is a 3-spindle, 3-unit-type machine which performs the drilling operations at a savings of 9.35 minutes over the former method. It also eliminates two machines which were formerly required to do the job.

This 4-way, 12-spindle unit-type machine effected a 90% savings in machining time for drilling and reaming the airplane engine crankcase. The actual saving time is 468 seconds on each crankcase. The operations consist of drilling and reaming six holes.



Machining time was reduced from 8.90 to 1.1 minutes by combining drilling operations on this vertical machine. The operations were formerly performed on three conventional single spindle machines at a combined time of 8.9 minutes. By drilling nine holes simultaneously, additional savings were effected in handling time.

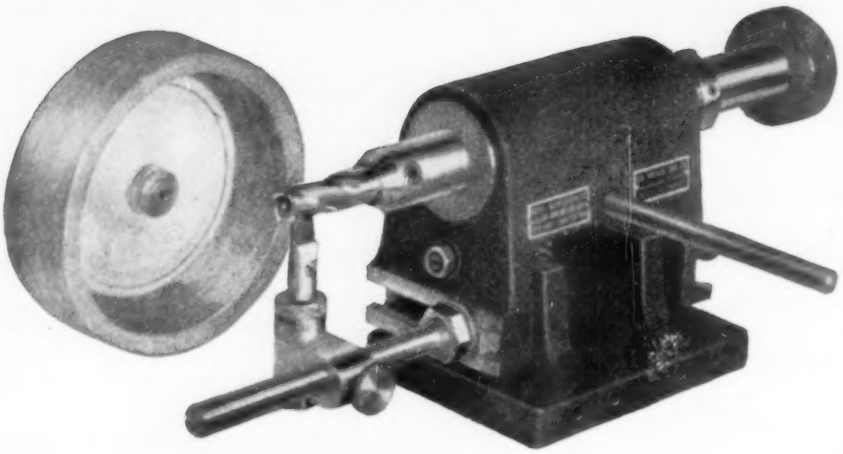
***FREE*—13 Helpful Bulletins.** These two sets of bulletins illustrate how others have used Barnes special machines in solving their metal-working production problems. They also describe the proper method and procedure in obtaining special machine tools to suit a specific problem. Write for them today. Ask for Bulletins 844.

W. F. & JOHN BARNES

W. F. and JOHN BARNES

325 SOUTH WATER STREET • ROCKFORD, ILLINOIS, U.S.A.

YESTERDAY'S PIONEER . . . TODAY'S LEADER



WELDON
END MILL SHARPENING FIXTURE

• Get full service from your WELDON End Mills by reconditioning them with the WELDON Sharpening Fixture. Quickly resharpens End Mills from 1/16" to 2" inclusive. Requires no centers or lead cams. It is unnecessary to line up the fixture as it will always grind straight. Designed for any grinder with flat table. No table movement necessary. So simple it can be operated even by unskilled workers. Conserves tools, time and money.

WRITE FOR DESCRIPTIVE FOLDER AND PRICES

THE WELDON TOOL CO. Cleveland 4, Ohio
3000 WOODHILL ROAD

INDUSTRIAL NEWS DIGEST

(Continued from page 128)

New Shop: Divine Brothers, buffing wheels, casters and industrial truck wheels, and machinery manufacturers, are moving their Utica, New York, plant to double floor space available for manufacturing.

The company's new Seward Avenue shop is adjacent to its machinery manufacturing plant, the Munson Mill Machinery Company. Total floor space of the two Utica plants is 150,000 square feet.

* *

Jobs for Veterans: In a forward-looking move, the Midland Steel Products Company, Cleveland and Detroit, is currently determining how many of the 111 job classifications in its plants can be handled by partially disabled veterans.

"Midland now has 693 people in the Armed Forces," E. J. Kulas, the auto frame manufacturer's president said. "Already 69 of our men have returned to us. The Selective Service Re-employment Act protects their jobs while they are fighting for our country, if they return able to handle their former work. But, even if they aren't able, we feel they should have a chance at other jobs in our plants."

* *

New Users: The Meehanite Metal Corporation, New Rochelle, New York, has revealed two additional companies now in production of Meehanite Castings in India; Jessops & Company, Limited, Calcutta; and Binny & Company, Limited, Madras.

Jessops & Company is one of the largest engineering concerns in India. Binny & Company is a mercantile concern supplying castings for cotton and textile mills, shipyards and public utilities.

* *

Expansion: The Salkover Metal Processing Company, with plants in Chicago and Long Island City, New York, has moved its Windy City operation into larger, more modern quarters at 1209 West Lake Street.

The Company specializes in commercial controlled atmosphere electric furnace brazing and bright annealing.

* *

Production Boom: Curtiss-Wright Corporation shipment of aircraft, engines and propellers during 1943 totaled $1,295,236,317, an increase of 68.1 per cent over 1942. This record pushed the corporation into top spot among American aircraft manufacturers.

Curtiss-Wright shipments for the year not only were the largest of any of the nation's aircraft companies, but mark the first time that any aircraft firm has exceeded a billion dollar volume for one year's shipments. This output, it is said, represents approximately 15 per cent of the industry's total dollar volume for the year. Net income after all charges except final renegotiation amounted to $12,883,347.

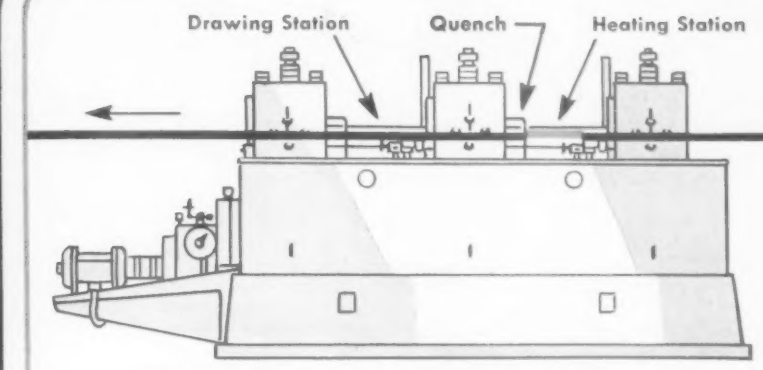
Progressive-minded Curtiss-Wright dumped $3,927,672 into capital expenditures, adding facilities for engineering and development and modernization of manufacturing methods on company-owned property in Caldwell and Paterson, New Jersey, and Buffalo, New York.

(Continued on page 132)

CUT COSTS 50%

IN HEAT-TREATMENT OF BAR STOCK

Conventional—$30 per ton **Tocco Process—$15 per ton**



TOCCO's localized, continuous heat treatment assures an absolutely UNIFORM bar stock

STANDARD steel bar stock enters the TOCCO machine shown above, is heated, quenched and drawn continuously as it passes through. It emerges as a *straight, scale-free* heat-treated bar with an absolutely *uniform* metallurgical structure throughout its entire length and cross-section (for maximum machining speed). All this at half the cost of the conventional method.

As many as eight TOCCO Bar Stock Units can be operated by one man, producing any desired tonnage of heat-treated stock in sizes of 3/8" to 3" diameter—any length.

Typical performance is for one man to treat 1 ton of 1-inch, S.A.E. 1045 stock per hour—hardened to 63-64 R.C. and drawn to 30-31 R.C. as shown above. Comparison of results:

CONVENTIONAL METHOD	TOCCO PROCESS
Costs $30 per ton	Costs $15 per ton, total
Heavy scale	Scale-free
Bar is distorted	Bar is straight
Hot, dirty conditions	Cool, clean
Non-uniform structure	Uniform throughout

TOCCO Engineers will gladly explain this machine further and study its application to your particular problems. Bulletin No. 14 free on request.

THE OHIO CRANKSHAFT COMPANY • CLEVELAND 1, OHIO

TOCCO

HARDENING..BRAZING
ANNEALING..HEATING

★

(Continued from page 130)

MOTOR MEMOS

Widespread industry opinion indicates autos by Spring if European conflict ends. Feverish activity in design suggests new models

DETROIT—Long awaited, the July 14 WPB-Automobile Industry Advisory Committee meeting was held while anxious reporters stood ready to flash the news that Johnny Q. Public would soon be able to buy a new car.

One headline would fit all the stories written that day: "Automobile Industry Too Busy for Conversion".

The Armed Forces appeared pleased at the outcome, the WPB appeared perplexed and one wag well aware of the behind-the-scenes activities here, said, "It looks like somebody is pulling somebody else's leg!"

In an effort to get early paper work necessary for conversion out of the way, the WPB had proposed a so-called "Blue Order" Plan visualizing a year's production of approximately 2,150,000 cars in comparison with the manufacture of about 4,300,000 units in 1941. After pro-rating the proposed output among the major producers, the assembled automen were reported to have said "no" as politely as they could.

Inability to see a reasonable margin or profit—if any—in this limited production caused the motormen to turn a deaf ear to the WPB long-range material-scheduling and production-limiting program. Yet, really surprising was the lack of interest in the WPB order effective July 22, which will permit the industry to build experimental postwar models.

The Committee from Detroit said their designers and engineers are so occupied with war work that they have no time for "new model" problems.

Then, a few days later, news leaked out that the outlook for new cars by April, 1945, was anything but black. If Germany is knocked out this year, or is on her knees by Spring, the WPB and Armed Forces are said to have agreed that new cars could roll as long as the auto industry met all war production requirements.

The flood of contract cancellations that will come with the conclusion of European hostilities makes it a certainty that the giant, sprawling motor industry can handle both jobs.

Though the WPB's "Blue Order" Plan was turned down, the industry is reported to have agreed to accept limiting production quotas during the first quarter of resumed operations. A 25 to 50 per cent cut in war contracts would free sufficient materials to eliminate the necessity of operating under the CMP, it was reasoned. Only one company, Willys-Overland, is said to have objected to the first quarter quota assigned it.

The combination of the initial quotas, plus the parts supplier problem which all concerns will face, the WPB and industry believes, will assure every producer an even break in getting cars onto the market.

When the July 29 WPB directive authorizing the placing of machine tool orders for postwar work becomes effective, the ball will really start to roll. Plant layouts and material requirements scheduling already are under way.

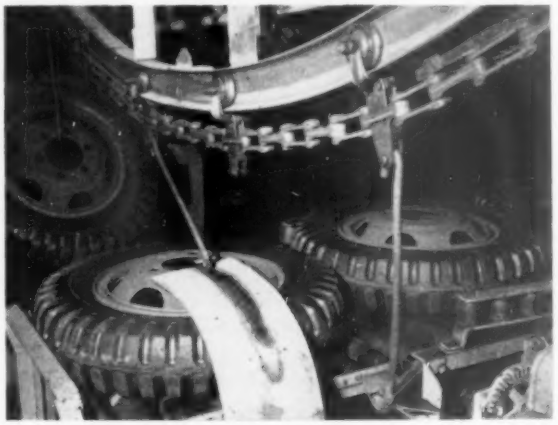
Another newsworthy WPB-Industry pow-wow is not many weeks away.

Nonetheless, the consensus of opinion in Detroit remains that the first cars built will be improved 1942 models. But a little snooping around the city convinces one that new and radically changed models may not be far behind the first jobs off the lines.

Industry Committee reports on designer manpower shortages aside, feverish activity is under way on engine, frame and body design. All the builders have new bodies on the boards.

Those who should know claim to have seen the postwar designs of one of the Big Three, which includes a "five

(Concluded on page 134)



Novel materials handling devices are contributing to accelerated output by Chevrolet of amphibious two-and-one-half ton trucks for the Army. Here, wheels are moved from one roller conveyer to another by automatically engaging and disengaging hooks.

CHEVROLET SPEEDS HATCHING OF "DUCKS" AT ST. LOUIS PLANT

●ST. LOUIS—The automobile industry is not all "Detroit". Late last year Chevrolet's assembly plant here was turning out military trucks. In December, it produced its first "Duck", the sensational two-and-one-half ton amphibious truck developed by the Army in cooperation with the General Motors Truck & Coach Division.

Chevrolet, serving as sub-contractor on assembly of the unit, cleared 300,000 square feet of factory floor space, shifted assembly lines and installed new, heavier equipment when the Army moved the amphibious truck to a spot high on the list of equipment needed for invasion.

Basically, the "Duck" is a powerful two-and-one-half ton truck set into a welded, watertight hull. It is capable of truck speed on shore and landing barge speed afloat. Today, the St. Louis Chevrolet assembly plant is producing the unit in volume.

Attaining production of this high-priority job was complicated by the necessity of training some 700 new workers. Within three months, the new personnel—including many women—was functioning capably, according to Chevrolet engineers.

Toughest nut cracked by GM men on the job was welding of the sheet metal "Duck" hull. With more than 1,000 feet of welding involved in each unit, a force of 300 welders is required to feed the final assembly line. Utilization of more than 250 jigs and fixtures costing as much as $7,000 each simplified both welding and final assembly.

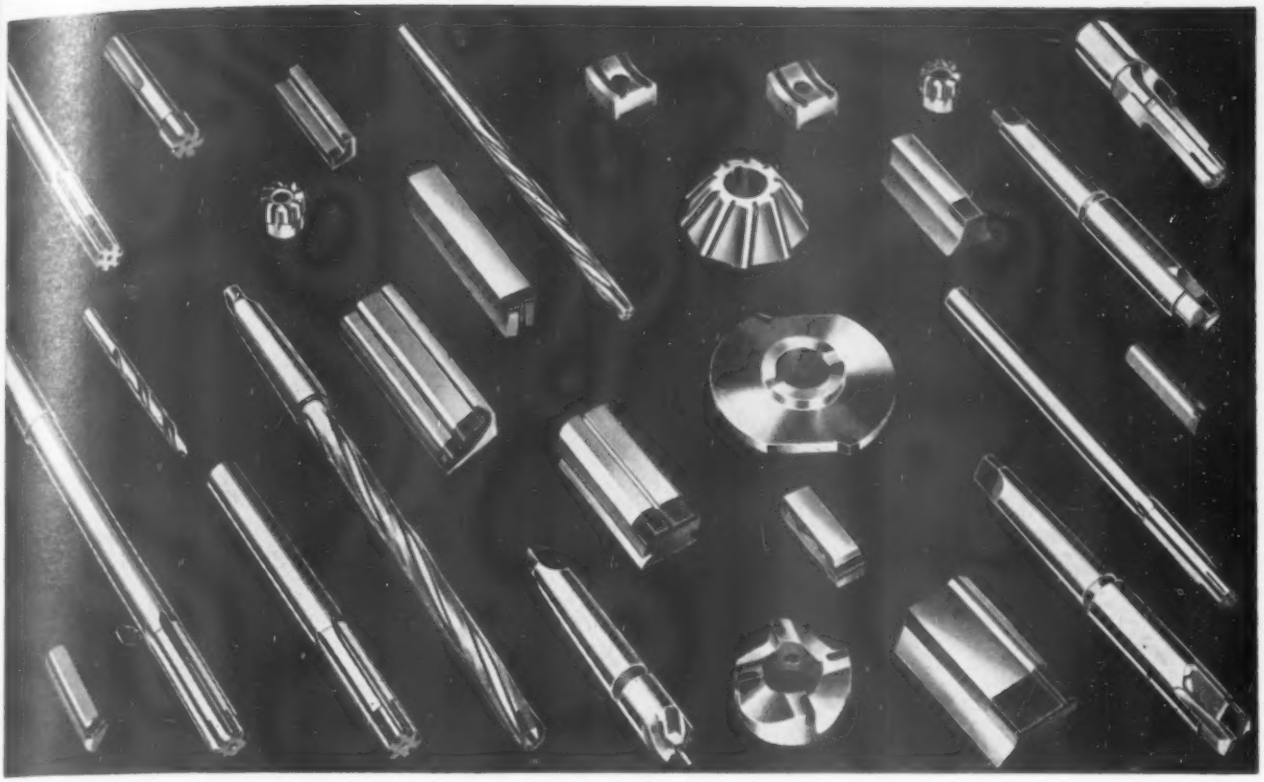
Because hull specifications call for watertight construction, test tanks were installed within the St. Louis Plant. In these, tests are made not only at intermediate stages of assembly, but as a final inspection when the "Ducks" are driven into the water and anchored by chains attached to springs. Afloat in the tank, the truck's propeller is run at full speed for 15 minutes.

To meet the Army's production schedules, much re-layout was necessary in the St. Louis plant. As usual in automobile manufacture, many operations were conveyerized. Typical is the "Duck" wheel conveyer line (pictured above), which is loaded and unloaded automatically through two ingenious fixtures developed by plant engineers.

After tires are mounted on rims, they progress along a roller line to a point directly under an overhead conveyer, which dips to meet the horizontal line. Hooked rods slide up over a curved plate which extends to the center of the wheels. As the conveyer line progresses, the rods drop into the wheels and pick them up.

Unloading the line reverses the process, with wheels falling flat on a second roller line which slopes away from the conveyer line in the direction the line is traveling. The hooks slide easily out of the wheels, releasing them to move on down to the wheel and axle assembly station.

Obviously, this single material handling device eliminates manual lifting in two instances. Such engineering for mass production has enabled the Chevrolet plant to exceed its initial schedule by 154 per cent, and to continue manufacture at a continuously accelerated pace for the six months.



These Tools Are

Super Specials!

★

In addition to manufacturing all types of special carbide-tipped tools, Super Tool Company makes a complete line of Standard carbide-tipped bits, reamers, plain and side mills, shell end mills, face mills, end mills, counterbores, drills and centers.

★

DO you have any production jobs that require special cutting tools? If so, consult Super Tool Company. For Super Tool engineers have the engineering knowledge, the actual production experience and unexcelled plant and laboratory facilities to properly analyze your requirements and to design and build special carbide-tipped tools that will bring you maximum efficiency and money-saving economy.

Super Tool Company manufactures carbide-tipped tools exclusively—and has done so for many years. These years of experience, research, development and improvement are your assurance of complete satisfaction when you use carbide-tipped tools bearing the Super Tool Company name.

Whether your cutting job requires special or standard tools, whether you are cutting cast iron, steel or non-ferrous material, if you want speedy production, long tool life, extreme accuracy, fine finishes and real economy, try Super Carbide-Tipped Tools. You, too, will say they're "SUPER!"

SUPER TOOL COMPANY

Carbide Tipped Tools

21650 Hoover Rd., Detroit 13, Mich. 4105 San Fernando Rd., Glendale 4, Cal.

(Concluded from page 132)

cylinder engine and tubular frame". The engine, rated at about 75 or 80 horsepower, is said to have passed operational tests with flying colors.

● **Production Picture:** Despite conversion talk, the auto industry remains up to its ears in war work—with the production outlook none too good in some quarters.

Obviously in an effort to strike home to lagging war workers the seriousness of the situation, Carsten Tiedeman, Regional WPB Director, revealed some unsavory facts late last month.

Citing the pressing need for military materiel at this stage of the European venture, Tiedeman said, "In view of these demands, the present status of war production programs is appalling. Steel plate production is falling off steadily. Some airplane production is lagging. The output of heavy tires is insufficient and so far in July the production of heavy trucks is 40 per cent behind schedule. We must bring production schedules up."

Much of such talk will set conversion plans back, lengthen and aggravate the already inevitable period of conversion unemployment in many of the more than 1,500 plants allied with the automobile industry.

Blue Chip News: Though the largest units of the automobile industry have steadfastly held out against adoption of the War Production Board's "Labor Management" program, at least one company has set a remarkable record in stimulating worker-contributed production ideas without the union coddling involved in the government-sponsored system.

For more than 25,000 production suggestions adopted in its plants last year, General Motors paid nearly $1,000,000 in war bonds and stamps.

The number of suggestions made in the Corporation's shops during the 12 months actually totaled 125,000. Of these, more than 25,000 were found practical by production engineers and now are in use. The maximum award for a single idea, a $1,000 war bond, went to 111 employees.

Ideas adopted range from machine setups to product design and assembly. Some with wide adaptability have been presented in recent issues of this magazine. How substantial the savings have been as a result of the GM program is indicated by these examples:

The grinding of sleeve bushings was increased from 85 to 642 per hour.

An adjustment of bearings in a secret weapon resulted in the delivery of 1500 additional units.

From a human interest standpoint, the story of the GM suggestion program is equally interesting. One employee contributed two practical suggestions that earned him the $1,000 maximum award twice in succeeding months. Proof that production men can look in strange places for latent mechanical skill is the fact that one of the $1,000 war bonds went to a 19-year-old girl working in a shop for the first time. THE END

SUPER WAR PRODUCTS MEAN MORE AND BETTER PLOWSHARES

George W. Mason, President, and A. M. Wibel, Vice-President, Nash-Kelvinator Corporation, study the Sikorsky helicopter their organization will manufacture. The first mass-produced machine is expected to roll from a Nash-Kelvinator assembly line within a month.

GEORGE W. MASON
PRESIDENT, NASH-KELVINATOR CORPORATION

THE peacetime experience of American industry in mass producing goods for the most mechanically minded nation in the world was the basic factor in enabling us to produce, in record time, the enemy-staggering quantities of weapons now being brought to bear on our foes.

Similarly, our intensive experience in meeting these quantities, and superprecisioned qualities, of war production is equipping us for proportionately expanded and improved peacetime production in the future.

● In short, the dual transition from plowshares—to swords—to plowshares holds practical promise of a future in which the variety and quality of our useful products of peace will be as superior to the things which we knew at the beginning of World War Two as compared to the things we know at the beginning of World War One.

In these comparisons lie both great promise and a serious responsibility for American business and industrial enterprise. Now, perhaps for the first time, we really know what we can do in the way of mass-production when we get our sleeves rolled up.

Concepts growing during the depression period that we had reached some sort of "ceiling" on our ability to expand our productive economy have been effectively shattered. Now the major objectives are to plan peacetime undertakings large enough to maintain something equivalent to our wartime production capacities in the era ahead.

● This problem establishes the dimension of the job we talk about as "postwar planning". In approaching it we should remind ourselves that the transition we must make begins where we are, not where we were. Too much postwar thinking and planning seems to be in terms of getting back to some level "where we left off".

That will not suffice if we are to capitalize on the technical and economic position to which the war has lifted us. To go back means to go down, because in terms of almost every factor—productive capacity, level of employment, degree of skill and precision available and quality of product, our experience in war has brought us to new levels.

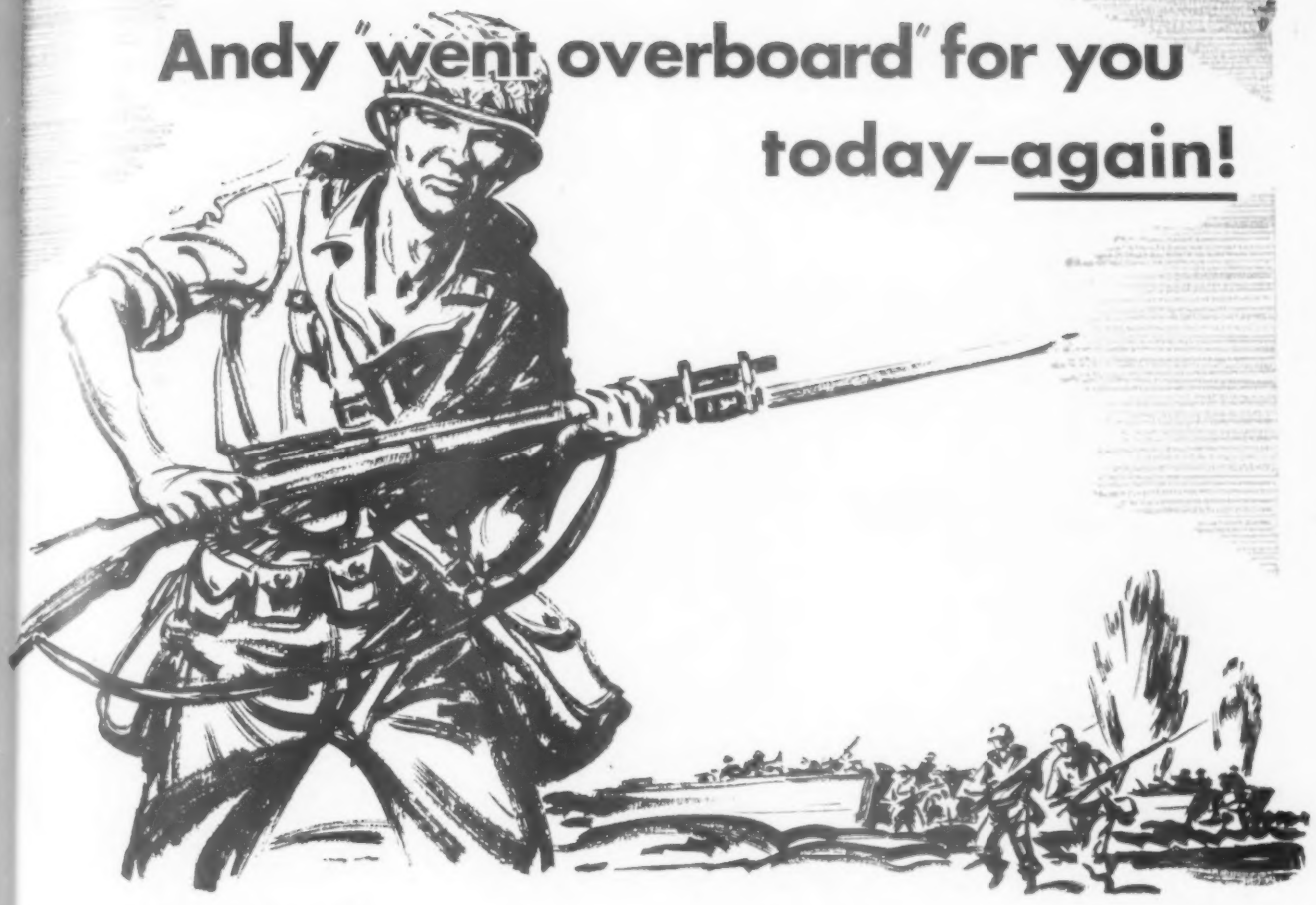
It is from this new high that we must convert, and insofar as is possible, we must convert to peacetime operations on a level commensurate with this wartime high. Prewar levels are no longer adequate measures by which to guide our future planning.

● *Moreover, technical men, whose first concern has usually been with the designing of the tools and then with the creation of the products, may find that henceforth they must take a more active interest in planning the over-all economic strategy necessary to maintain our economy at levels comparable to the present.*

The planning and executing of this strategy will be everybody's job and it cannot be done in the armchairs of the conference room alone. War production has brought the laboratory and the shop much closer together. Having cooperated our way through the bottlenecks of war production, we should all profit by the experience.

Fortunately we will be helped in the early stages of our transition to a high level of peacetime production by the vast "backlog demand for goods and services occasioned by the war. But the crux will be how well we utilize this "head start market" as economic insurance for the period required to plan a long-range peacetime economy that goes on up from here.

Andy "went overboard" for you today–again!



SOMEWHERE out there early this morning Andy and his gang went overboard in a surprise attack that will make history. That recalls other days when as salesman for your Industrial Supply Distributor◆ Andy used to "go overboard" regularly to help locate the hard-to-get materials you had to have to keep turning out war stuff on schedule.

Overseas training is helping to qualify Andy for a better job with your Industrial Supply Distributor, come peace. Meanwhile please remember that because his organization has devoted years to preparation for the peak demands of Industry, your Distributor has earned the opportunity to help you keep your present war production up to schedule.

Your Distributor can furnish everything you need in equipment, materials, supplies. Make him your central source instead of ordering from the factory and you will save manpower and time, reduce paper work and expedite your deliveries.

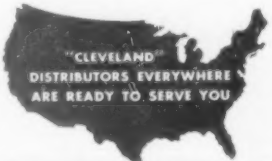
Till Andy comes home—and from then on—

Telephone your ◆◆◆ FIRST!

The CLEVELAND TWIST DRILL COMPANY
1242 EAST 49TH STREET
CLEVELAND

TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

30 READE ST. NEW YORK · 9 NORTH JEFFERSON ST. CHICAGO · 650 HOWARD ST. SAN FRANCISCO
6515 SECOND BLVD., DETROIT · LONDON - E. P. BARRUS, LTD. - 35-36-37 UPPER THAMES ST., E.C.4



to make good DRILL PRESSES do their best...

Add a GRAY-MILLS *Coolant System* to all machines. To speed production and be sure of getting the best out of tools and machines, you simply equip them with Gray-Mills Coolant Systems. They apply the exact amount of coolant needed directly on cutting tools, to speed production, prolong tool life and improve finish. The units are very easy to install and low in cost too. There is a complete range of standard Gray-Mills pumps—gear and centrifugal—coolant return pans and fittings to suit most any application.

Let your machines do their best—and help your tools give better service longer, by installing Gray-Mills Systems. See your Mill Supply distributor or write us for complete details and a catalog.

PROMPT DELIVERY

GRAY-MILLS CO.

1952 Ridge Ave., Evanston, Ill.

Complete Portable

COOLANT SYSTEMS

FRACTIONAL H. P. PUMPS

INDUSTRIAL FLUID REFRIGERATING SYSTEMS

—MACHINE TOOLS—

(Concluded from page 112)

ardization and operator motion economy, is planning to present the program soon to production men and machine tool designers.

The GM machine tool film, which emphasizes machine design characteristics which tend to reduce operator efficiency through reaching and bending for loading, unloading and operating controls, has been revised and augmented with a sound track. Johnson's talk and slide film on machine tool standardization, originally prepared for the brass hats of the industry, has been revamped and slanted to interest the men who actually use and design machine tools.

"We are trying to present a program, probably about two hours long, that will interest engineers in the shop and on the design board," Johnson said. All of the original 10 General Motors requirements in the standardization of machine tools (see The Tool Engineer, June, 1944, pg. 107) are covered in the revised program, he explained.

Standardization is only a "by-product" in the GM presentation. Actually, the auto manufacturer, who is now using approximately 150,000 machine tools and has indicated an interest in purchasing 20,000 or more new machines, is interested in effecting machine design to (1) conserve operator motion and time, (2) reduce the maintenance problems imposed in machines of current design, and finally (3) influence other users of machine tools and builders to recognize the advantages inherent in standardization of motors, controls and accessories.

Johnson, who brought the machine tool builders to the edges of their chairs with his earlier presentation, is scheduled to present his revised 2 hour program in Rockford, Illinois, September 7; Cleveland, Ohio, October 2; Worcester, Massachusetts, October 10; and Springfield, Vermont, October 11.

New OPA Regulation Covers Special Machine Tools

WASHINGTON—Machine tool builders, long dissatisfied with OPA pricing regulations, have finally gotten a break. Provision covering sales or new machines, attachments and parts, have been broadened and issued in the form of a new price regulation, No. 67.

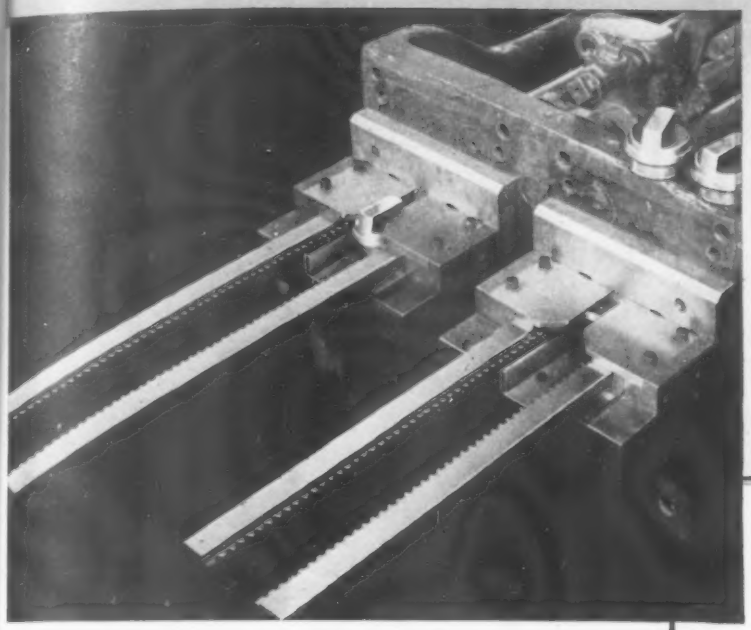
Though it is not intended to change the present levels of pricing, the new rules should simplify pricing procedure on special machines.

All prices remain frozen at October 1, 1941, levels. But the addition is now permitted of resale discount or commission to the price in effect on that date on the last contract price between January 1, and October 1, 1941, in the case of new machines or parts which the manufacturer intends to distribute through dealers for the first time.

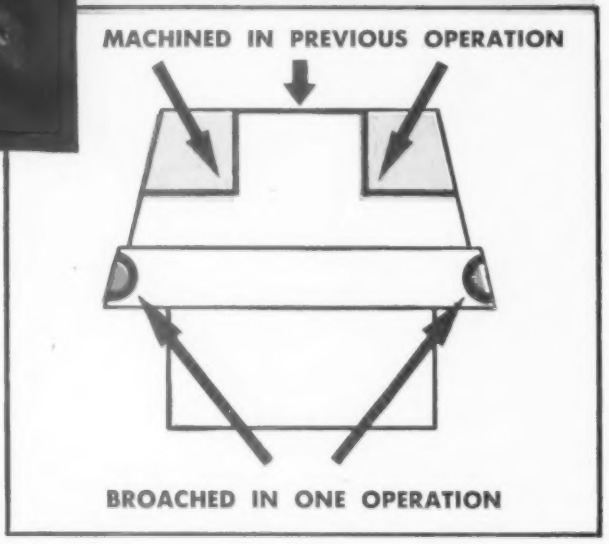
Maximum prices for new tools and parts involving more than a modification of an article for which a maximum price is established may be determined by the use of the pricing formula the manufacturer had in effect on October 1, 1941. THE END

Use Broaching

FOR SIMPLE JOBS, TOO



PRODUCTION IS HIGH YET TOOLING COST IS EXTREMELY LOW



NOT all broaching jobs involve automatic fixtures, complicated holders and expensive tooling. Here is the simplest kind of a set-up . . . but one that increased production and lowered part costs materially. • The part is a 75 MM fuze body. The blank is turned on a screw machine and the five surfaces indicated have been machined previously. Then the slots in the sides are broached using the set-up shown above. The simplicity of the fixture is apparent since no locking or clamping device is required. The tools are slightly modified standard keyway broaches; simple and inexpensive. • Call a Detroit Broach engineer and find out about the jobs in your shop that might be broached. Let him give you full production and cost data. You will not be obligated in any way and he may be able to show you where you can increase production . . . lower costs . . . make more efficient use of manpower.

ARMY E NAVY

DETROIT BROACH COMPANY

20201 SHERWOOD AVENUE • DETROIT, MICHIGAN
9308 SANTA MONICA BLVD. • BEVERLY HILLS, CALIFORNIA

Versatile

•IN CONSTRUCTION •IN APPLICATION

. . . The Norton Multipurpose

THIS grinder's particular field is in miscellaneous, small-lot general production, in difficult applications, or in tool room work.

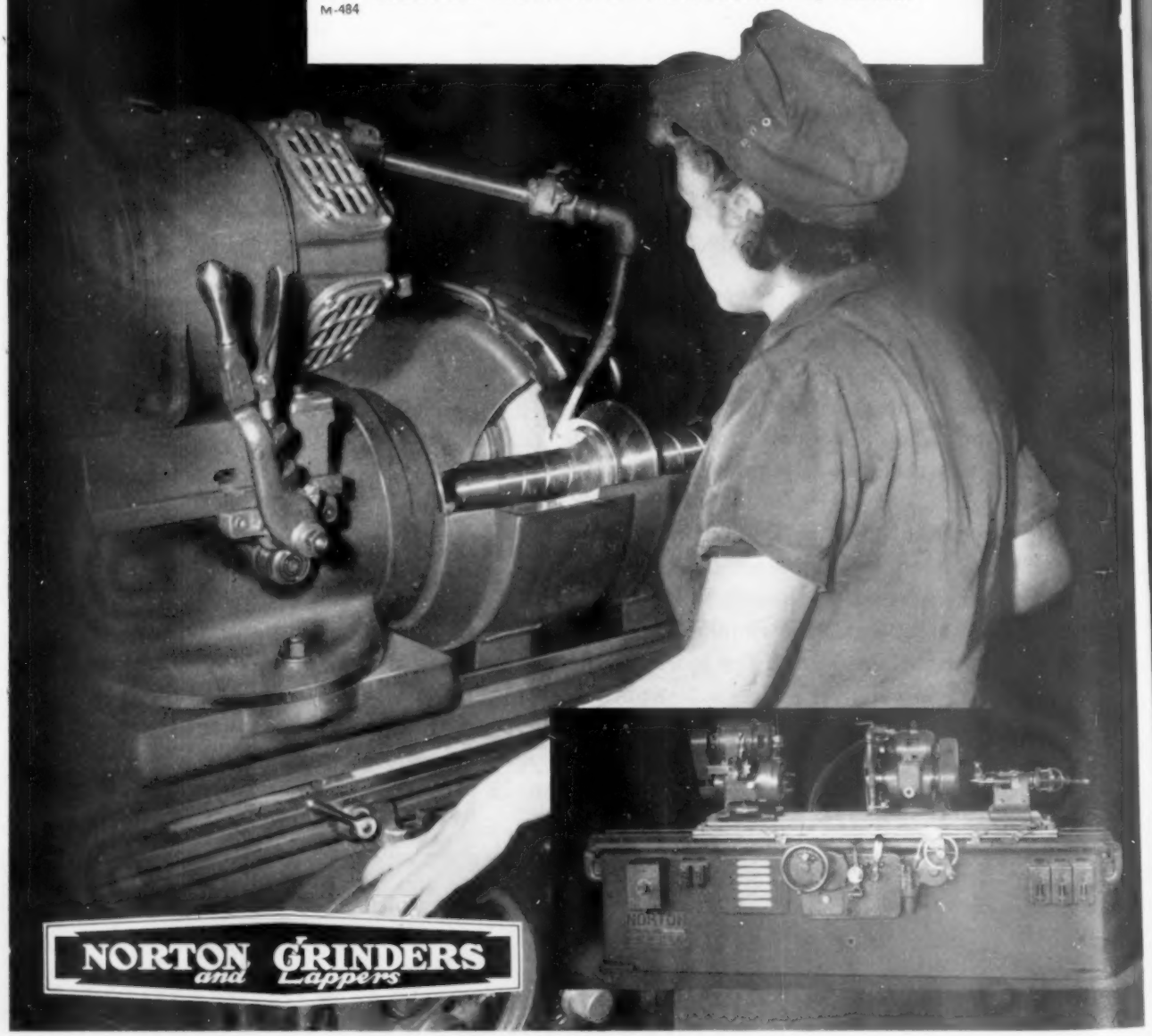
Its standard equipment, mounted on a massive base, gives versatility to handle a variety of work quickly and accurately.

Within arms' reach of the operator's normal position are all the principal machine adjustments and operating controls.

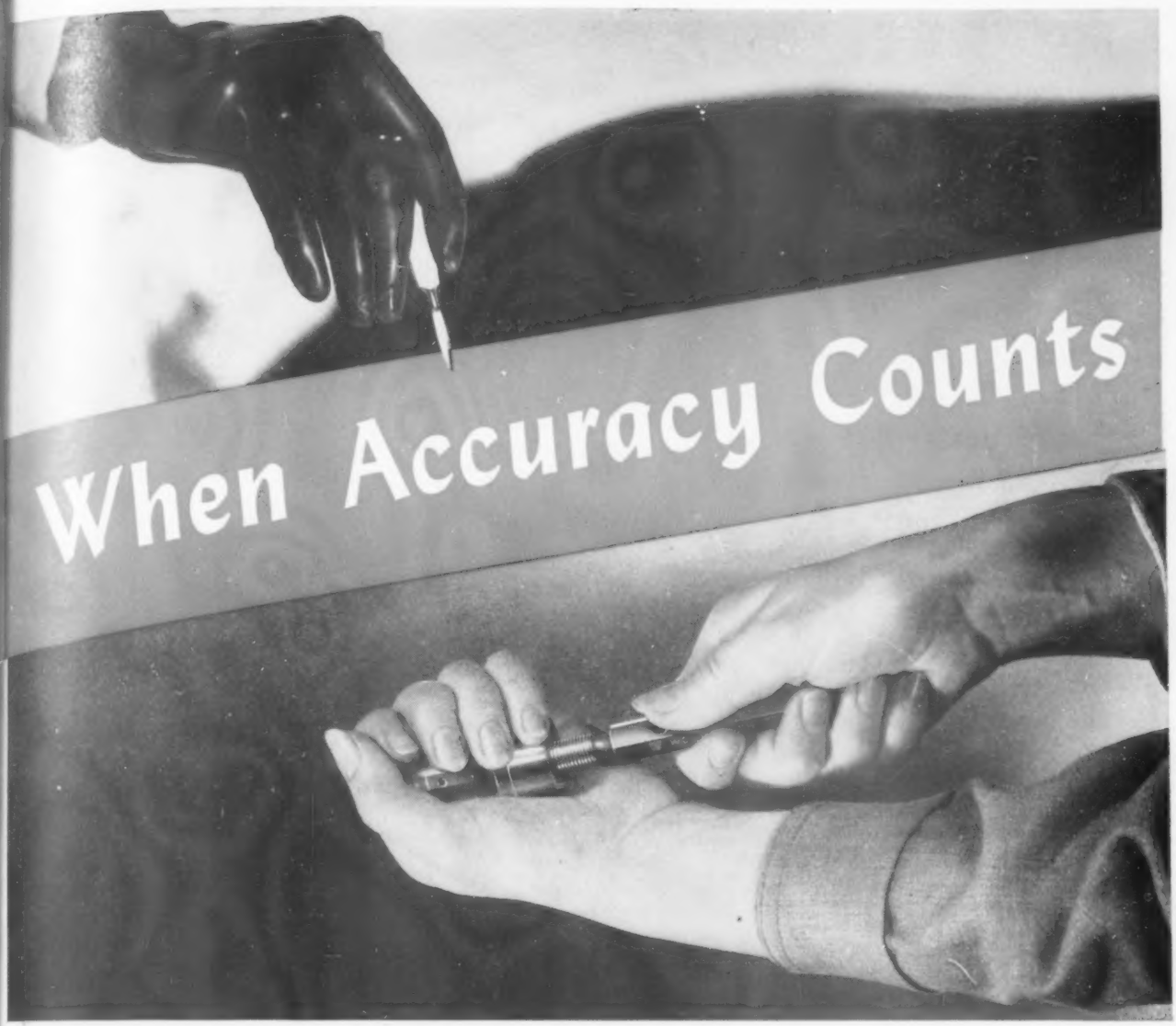
A pictorial folder on the Norton Multipurpose Grinder will be sent on request—no obligation.

NORTON COMPANY, WORCESTER 6, MASS.

M-484



NORTON GRINDERS *and Lappers*



WHEN the sensitive hand of a world famous surgeon grasps his scalpel and with a deft stroke, makes an incision, that is when accuracy counts. When the inspector gages a component of a bomber engine, that is when accuracy counts. The very lives of our pilots and air gunners often may depend on the accuracy of the gage.

Woodworth gages are accurate . . . fashioned to astronomically close limits, Woodworth gages are dependable . . . reduce production costs by their long service life . . . Woodworth gages possess "Accuracy You Can Trust."

Write or wire for catalog 44-G today.

ACCURACY YOU W CAN TRUST

WOODWORTH

N. A. WOODWORTH CO., SALES DIVISION, 1300 E. NINE MILE ROAD · DETROIT 20, MICHIGAN

PRECISION GAGES · GROUND THREAD TAPS · FORM TOOLS · PRECISION MACHINED PARTS · HEAT TREATING · PLATING

● This 1944 edition is a 134 page, cloth-bound book containing 163 illustrations. It is equally valuable to the planer operator and the man responsible for obtaining high production at low cost.

If you do not own the 1940 edition you owe it to yourself and your company to buy a copy today and learn planing the Hypro Way.

Many leading American corporations have bought Treatises for each of their planer operators and all executives handling metal machining problems. Just fill in the coupon below and enclose your dollar. If abroad please send international money order.

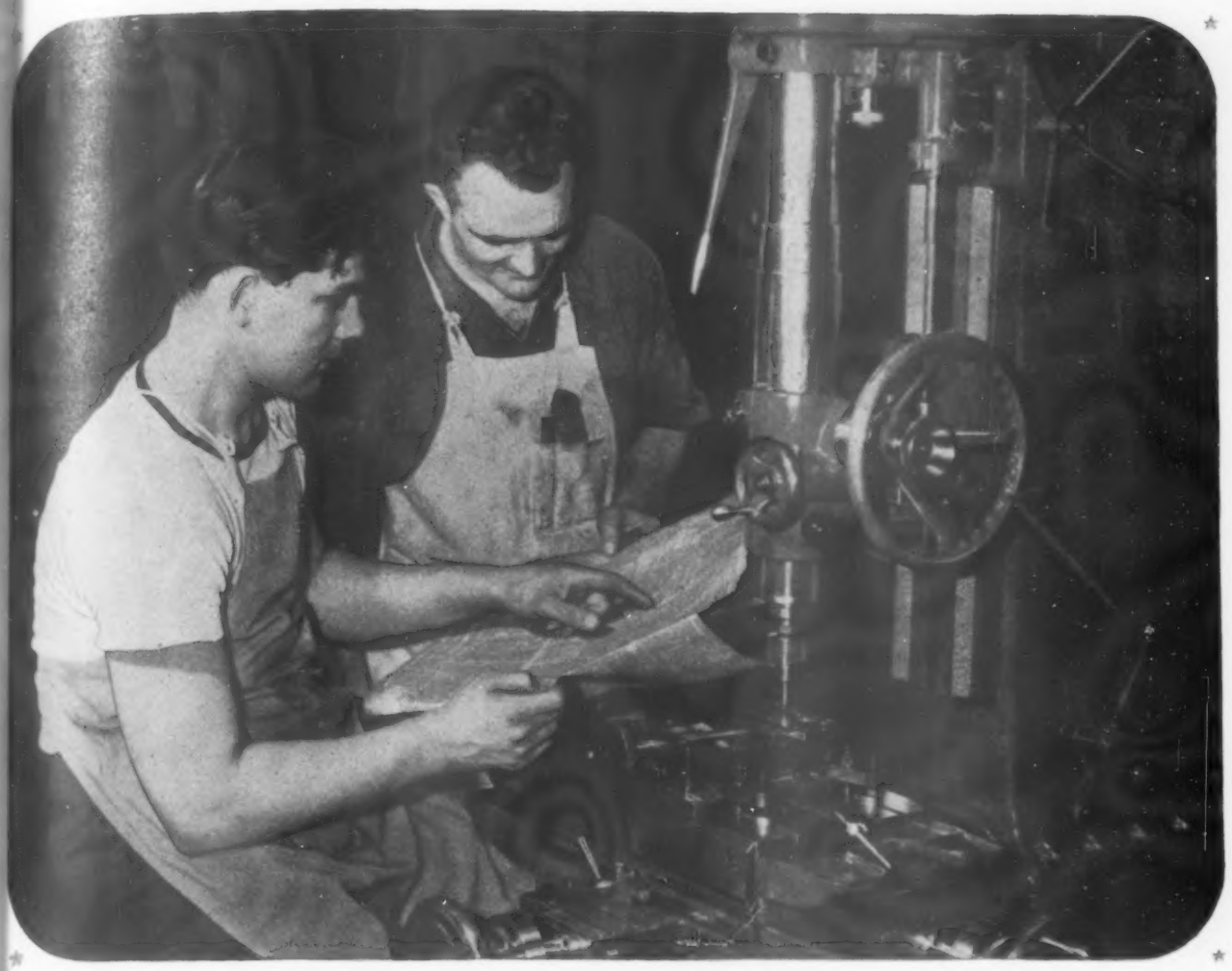
THE CINCINNATI PLANER CO.

3126 Forrer Street, Cincinnati 9, Ohio

Please send me the 1944 Treatise on Planers. I want to learn planing the Hypro Way. My dollar is enclosed.

Name..... Firm.....

Street..... City..... Zone..... State.....



One of these Days THEY'LL BE WORKING TO A DIFFERENT SET OF BLUEPRINTS

HAND BOOK OF SPECIAL STEELS

Newly revised and reprinted—a comprehensive book on the properties, uses, and best methods of handling, treatment, etc. of tool, stainless and other alloy steels. Plenty of tables to facilitate quick reference and selection. 136 pages, pocket-sized, latest data.

SEND FOR YOUR COPY

Address Dept. TE-23

A GREAT many companies—yours probably included—already have a clear idea what items those new blueprints will cover. One thing's sure: whether your future products stay in familiar fields or enter new markets, they'll have to be as modern and value-packed as your engineers can make them. Improved design, and the use of better materials, are the means to the end.

You'll find a lot of your "better materials" answers among the various Allegheny Ludlum families of special, high-alloy steels. If you're looking for such qualities as improved electrical characteristics, finer appearance, greater strength, resistance to heat, wear or corrosion, etc., we have the design and production data you need. Let our Technical Staff help with your plans.

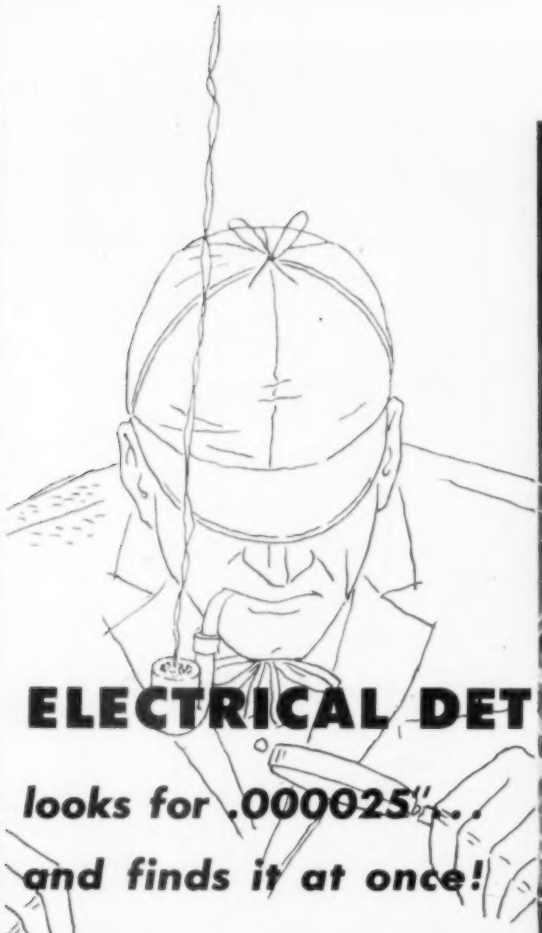
AL

STEEL FOR THE NATION'S WELFARE

Allegheny Ludlum
STEEL CORPORATION

GENERAL OFFICES: BRACKENRIDGE, PENNA.

W & D A-9330



ELECTRICAL DETECTIVE

looks for .000025"... and finds it at once!

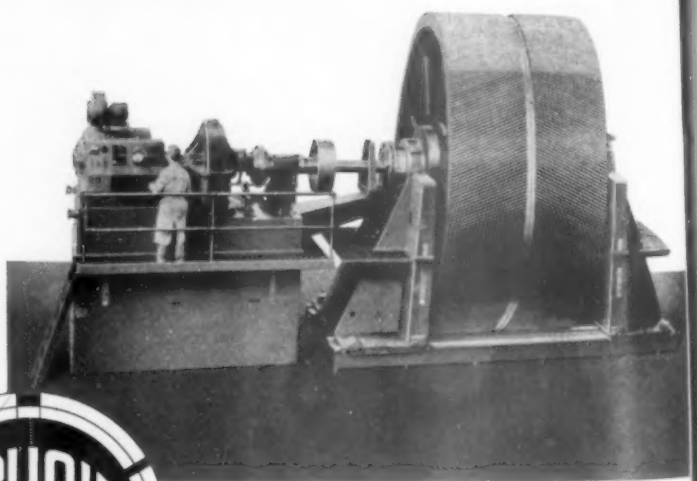
ANYTHING as small as .000025" doesn't register on the human senses. But such minute clues don't escape this electrical sleuth. Picking up the faintest vibration caused by unbalance, the Gisholt Dynetrics *locate, measure,* and *apprehend* the offending elements—all in a few seconds!

You may never need accuracy down to .000025" in commercial work. But it's there when you want it. And because the Dynetrics provide it so quickly, and so easily, they put static and dynamic balancing of rotating parts on a mass production basis at lower cost than ever before.

With so little time and effort needed to assure smoother, quieter operation and longer life in your product, isn't it wise to investigate now? Write for literature about Gisholt Dynetric Balancing Machines.

GISHOLT MACHINE COMPANY
1229 *E. Washington Ave., Madison 3, Wis.*

Look Ahead... Keep Ahead...
With Gisholt Improvements



GISHOLT

DYNETRIC BALANCING *is used to eliminate vibration in this huge herringbone marine gear. The same basic principles are applied to correct balance in any rotating part weighing from 1 ounce to 50 tons. Gisholt engineers will gladly recommend the type best suited to your requirements. Write us.*

THE ARO PNEUMATIC IMPACT WRENCH

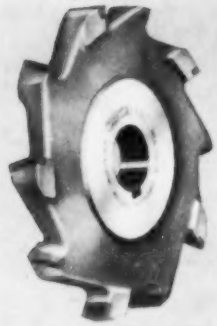
● This new ARO Model 131 Reversible Impact Wrench says "when" automatically—it's the *only* impact wrench with Controlled Torque!

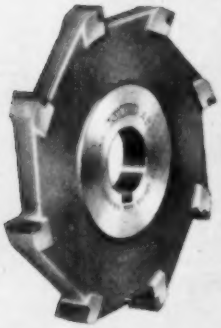
Specially designed to increase the speed and accuracy of nut and bolt setting operations up to ⅜" size...sets bolts and nuts without danger of stretching or "burning".

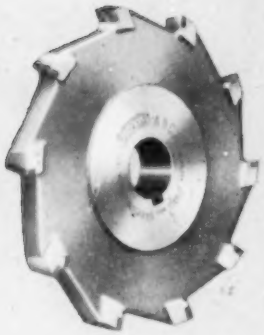
The simple *impact roller clutch mechanism has only 4 parts* and is so constructed that when predetermined torque is reached, the rollers rebound out of engagement with the hammer, thus avoiding any chance of stretching the bolt. Operator controls torque by merely turning calibrated adjusting screw. Write for new catalog No. 44.

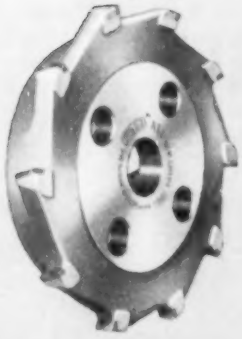
The Aro Equipment Corporation, Bryan Ohio.

THE ARO EQUIP. CORP. ARO BRYAN, OHIO









TungTip

PRESENTS
THE

ABC's
OF
CARBIDE MILLING

A **LUMINUM** — MILLED AT HIGHEST FEED WITH 1000% MORE PARTS PER GRIND

B **RASS · BRONZE** — MILLED TO PRECISION TOLERANCES AT MAXIMUM FEED OF MILL

C **AST IRON** — MILLED AT CAPACITY OF MACHINE WITH GRINDER-LIKE FINISH

Write for
THE FIRST OF A SERIES OF ENGINEERING BULLETINS

TungTip

TOOLS

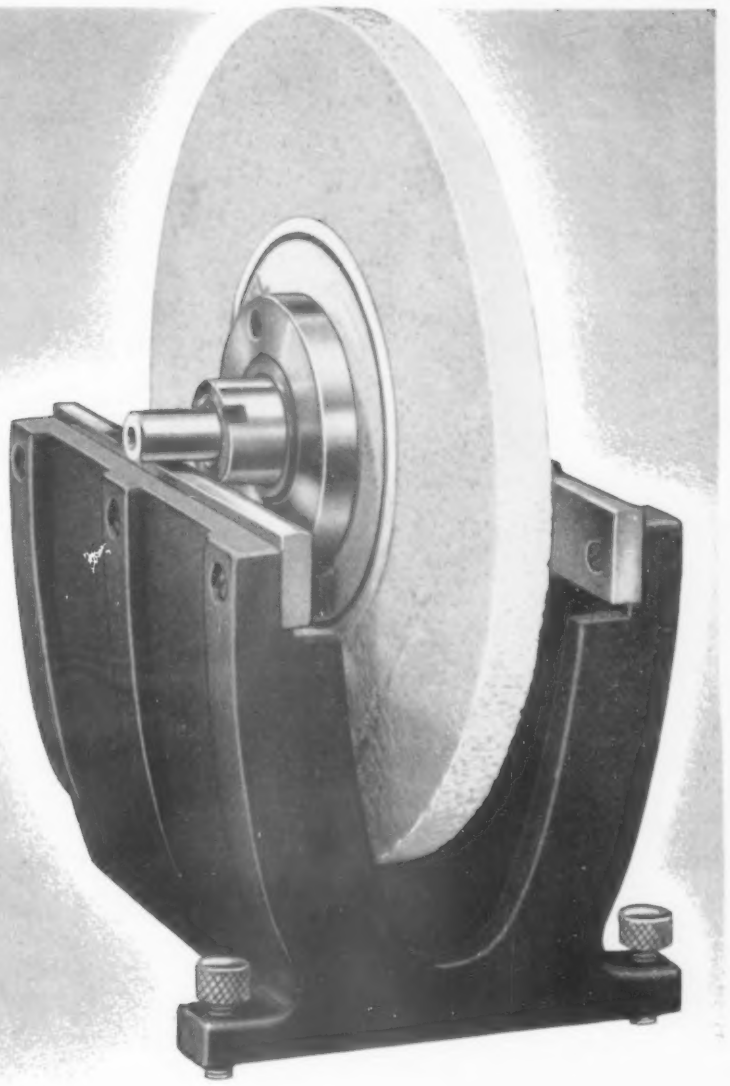
P. O. BOX 88 • DIVISION OF • MONROVIA, CALIF.

LOWELL AND GRAYSON

FORMERLY

Grayson Manufacturing Company

For Improved Results in Surface Grinding



...use this *New Taft-Peirce Balancing Stand*

FOR WHEELS UP TO 7" DIAMETER

This stand should be used for properly balancing wheels on the Taft-Peirce No. 1 Precision Surface Grinder, the Taft-Peirce 6-inch Rotary Surface Grinder, or any other machine using wheels up to 7 inches in diameter.

Taft-Peirce makes this new balancing stand with a sturdy cast-iron base, and with two hardened rails on which the balancing arbor may roll freely to indicate the balance of the mounted wheel. Order this new Taft-Peirce Balancing Stand *now*, for promptest delivery.

THE TAFT-PEIRCE MANUFACTURING CO.
WOONSOCKET, RHODE ISLAND

A Company is known by the company it keeps.

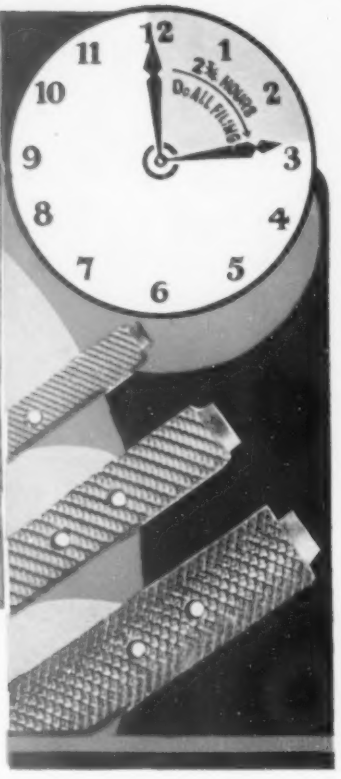
Delco-Remy
S.K.F.
Warner & Swasey
American Locomotive Company
Hyatt Bearings
Master Electric Company
Deere & Co.
International Harvester
Bullard Co.
Wright Aeronautical Corp.
Delco Products
Spicer Manufacturing Company
Western Gear Works
Buick
General Motors Truck & Coach
Nash-Kelvinator
Bell Aircraft
Lufkin Foundry
Consolidated Vultee Aircraft
Frigidaire
Detroit Gear Aircraft
D. O. James Manufacturing Company
Ottumwa Iron Works
Caterpillar Tractor Company
Cadillac
Thompson Products
Oliver Farm Equipment Company
Link Belt
Gleason Works
Allison
Ford Motor
Warner Gear
John Deere Tractor Company
Consolidated Steel Corp.
Packard
Saginaw Steering Gear
Hudson
Heald Machine Company
Jack & Heintz
Philadelphia Gear Works, Inc.
Curtiss Wright
Chrysler
Cincinnati Milling Machine
General Electric
R. G. LeTourneau, Inc.
Pontiac
Emsco Derrick & Equipment
Chevrolet
American Bosch
Youngstown Sheet & Tube Company
Kearney & Trecker
Continental Motors Corp.
Studebaker
Reed Roller Bit
Chicago Gear
Sperry Gyroscope Company, Inc.

NATIONAL TOOL appreciates the opportunity of providing metal-cutting tools for these companies and many other leading industrial institutions.

NATIONAL TOOL Co.

11200 MADISON AVENUE . CLEVELAND, OHIO

10 HOUR JOB IN 2¾ HOURS *with* DoALL BAND FILER



That's right! 7¼ man hours were saved on each Pierce Punching Die for a large aircraft manufacturer. This die is made of plow steel and measures 16 x 15 x 3 /16". A ½" flat DoALL File Band was used for the straight surfaces, a ½" oval file for the large radii.

This new DoALL Band Filer is 9 times faster than hand filing—4 times faster than jig filing. Gives you smooth, steady, one-way filing, without back stroking. Saves time, metal and file bands.

Strong support holds file band firm and means more even cutting. Speed-master equipped for variable speed, 50 to 250 f.p.m.

Operators like the roomy, tilting work table and the air jet which keeps it free from dust and chips. Weighs 485 pounds. Occupies only 27 x 34" floor space. Available on M.R.O. priority.

DoALL FILE BANDS

Ready to prove their worth. 12 standard styles to file different kinds of metals, alloys, laminates, plastics. Made to fit the new DoALL Filer or any model DoALL Contour Machine.

DoALL

INDUSTRY'S NEW SET OF TOOLS

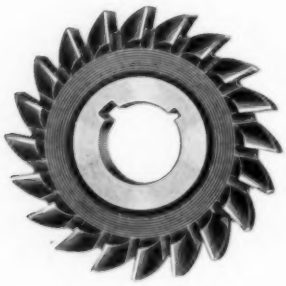
Write for Illustrated Literature

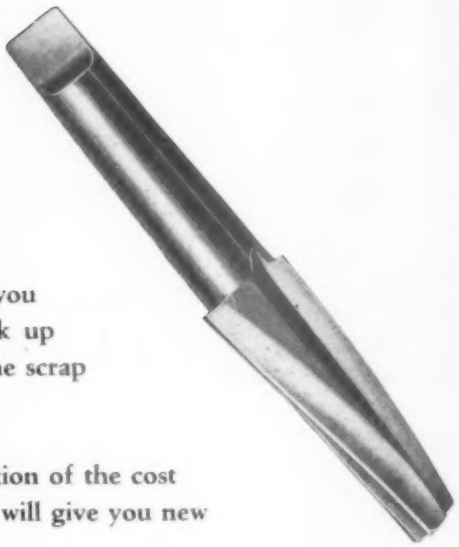
CONTINENTAL MACHINES, INC.

1304 South Washington Avenue • Minneapolis 4, Minnesota

Sales & Service Offices: Baltimore, Boston, Chicago, Cleveland, Denver, Detroit, Erie, Houston, Indianapolis, Los Angeles, Milwaukee, Minneapolis, New Orleans, New York, Orlando, Philadelphia, Pittsburgh, Rochester, Rockford, St. Louis, San Francisco, Seattle, Toledo, Tulsa, West Hartford.

Leading
FOR OVER 1/3 OF A CENTURY





★Even if you cannot get the new tools you need immediately, you needn't miss any valuable production time if you will check up on your worn tools or tools that you may have placed in the scrap pile.

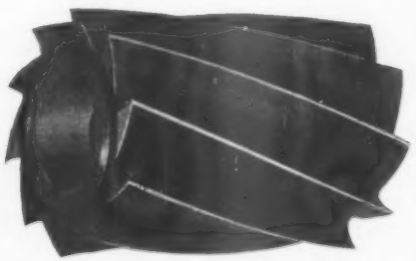
★These tools can be reclaimed and recut for a fraction of the cost of new tools. When recut by our method, they will give you new tool production and service.

★We help hundreds of companies daily to solve their tool shortage problems. Even when special tools are needed, we can very often recut these from worn tools or furnish you with standard tools and recut them to your specifications.

★You'll find it easier, quicker, more profitable to consult with us on your tool problems. You can rest assured that your orders will receive prompt and courteous consideration.

Eastern Cutter is Dependable

Invade YOUR SCRAP PILE TO CUT TOOL COSTS!

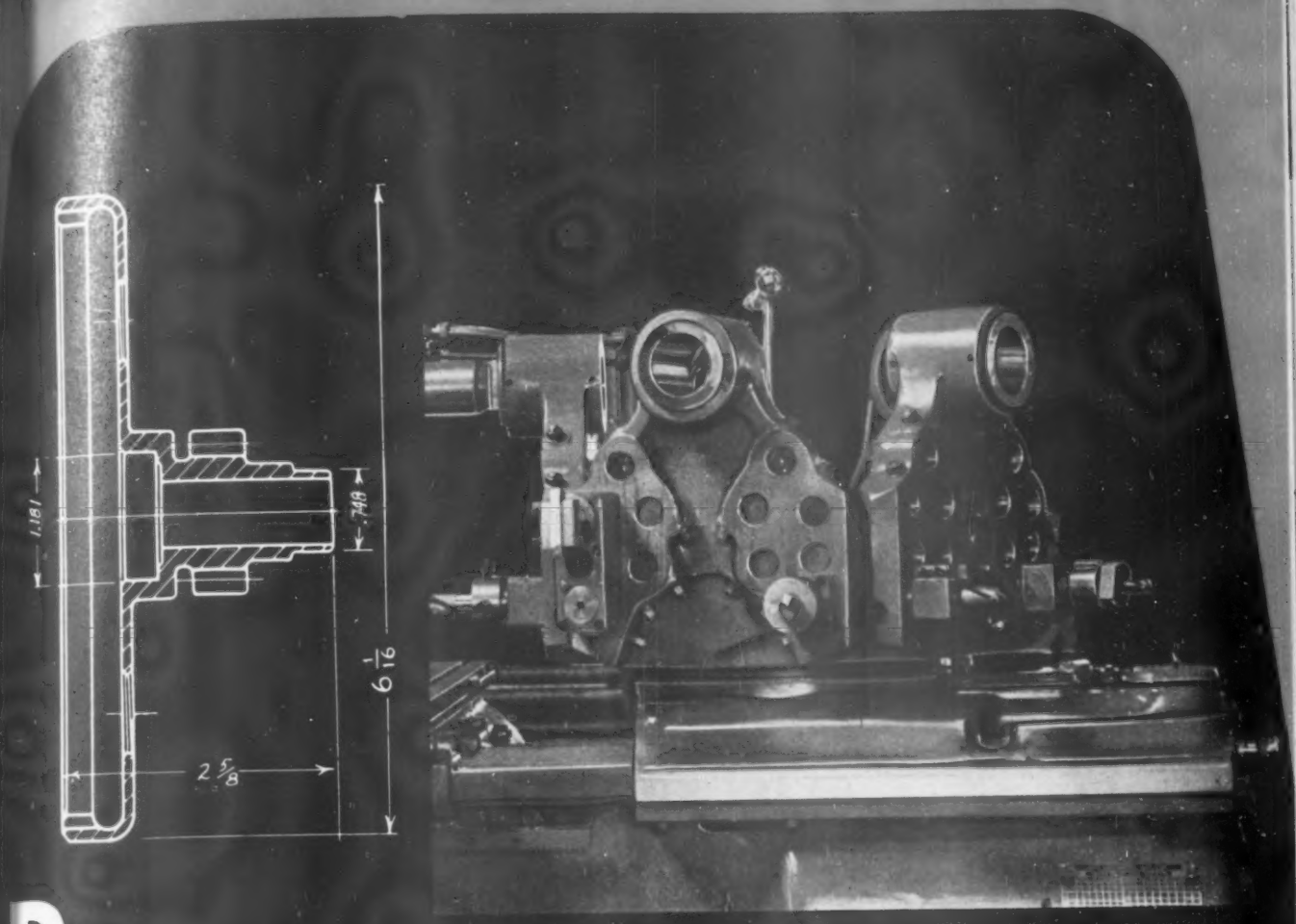


A COMPLETE RECONDITIONING SERVICE FOR TOOLS

NEW MILLING CUTTERS FROM OUR STOCK OR YOUR OWN STANDARD CUTTERS CAN BE QUICKLY CONVERTED TO SPECIAL CUTTERS

EASTERN CUTTER CORPORATION 30-32 Littleton Ave., Newark 7, N. J.

Chrome Plant **MASTER CHROME SERVICE** INC., 5709 Herman Ave., N. W., Cleveland, Ohio



RE-TOOLING *by* P&J PROTECTS YOUR ORIGINAL INVESTMENT *in* LOW COST PRODUCTION

Originally tooled for gear blanks

P&J 5-D-2 (two spindle) 12" Automatic provides the means of handling either two identical operations simultaneously or two entirely different operations. Set-up for rough and finish machining the gear blank illustrated, this machine demonstrated its high efficiency and production with an exceptional degree of accuracy.

...but with re-tooling possibilities for other work

Owners of P&J Automatic Chucking Equipment made a wise investment in their original purchase of P&J equipment. They bought not only the special tooling they needed for a specific job (such as the one illustrated here) but also the *tooling possibilities* for other work. By the comparatively simple procedure of re-tooling, their P&J machines may be converted to handle other jobs and other operations, but with the inherent conveniences, efficiencies and accuracy of original machines maintained intact.

An investment in RE-TOOLING will enable you to handle future work economically and derive further worthwhile returns from your investment in P&J equipment. Our engineers and the facilities of our shop are at your service.

P & J

Rebuilding Service

Restoration of present P&J machines to their original accuracy and productivity through rebuilding in our plant is available to owners of P&J equipment. Re-tooling can be handled also at the same time, if desired. Investigate.

BUY BONDS *and* SAVE LIVES

POTTER & JOHNSTON MACH. CO., *Pawtucket, R. I.*

COUNTERSINKING CRANKSHAFTS

CIRCLE-R COMBINATION CENTER DRILLS WERE *"Made to Order"* For This Operation

TRADE MARK

These drills are coping with one of the toughest crankshaft production jobs in the automotive industry. In this capacity a smaller size combined drill and countersink is used for spotting, followed up with a larger size drill.

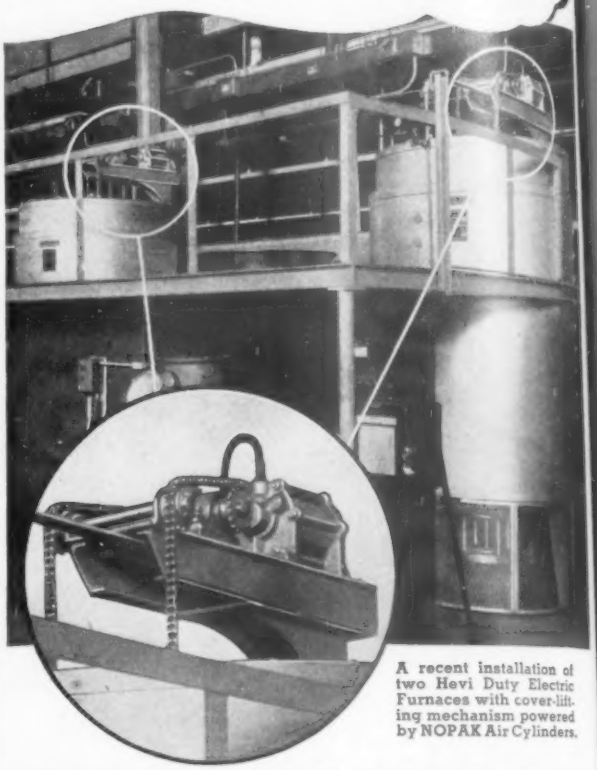
CIRCLE-R CENTER REAMERS are helping to boost production in the airplane industry where they are used for countersinking of rivet holes. Circular Tool furnishes the majority of reamers used for this purpose.

Send today for Circular Catalog — K

CIRCULAR TOOL CO., INC.
PROVIDENCE 5, R. I.

LOS ANGELES · ROCHESTER · INDIANAPOLIS · DETROIT
CHICAGO · PHILADELPHIA · NEW YORK · DAYTON
CLEVELAND · ST. LOUIS

1000 lb. Furnace Covers ...AN EASY LIFT with NOPAK Air Cylinders



A recent installation of two Hevi Duty Electric Furnaces with cover-lifting mechanism powered by NOPAK Air Cylinders.

Because Hevi Duty Electric Pit-Type Heat Treating Furnaces are charged from the top, the 1000 lb. steel cover is lifted and swung aside for every charge. To save time between charges, Hevi-Duty design engineers devised a simple, roller-chain lifting mechanism featuring ingenious 3-point cover suspension. Lifting power is supplied by a 6" Model A NOPAK Air Cylinder with 6" stroke, mounted directly on the swinging boom.

The positive-acting air cylinder, controlled by a NOPAK 4-Way Valve, lifts or lowers the heavy cover gently and accurately in a matter of seconds, conserving valuable heat-treating time.

This Hevi Duty solution to a heavy-duty lifting problem may suggest how NOPAK Cylinders may be used for lifting, pushing, pulling, positioning or clamping operations in your plant. Write for illustrated bulletins.

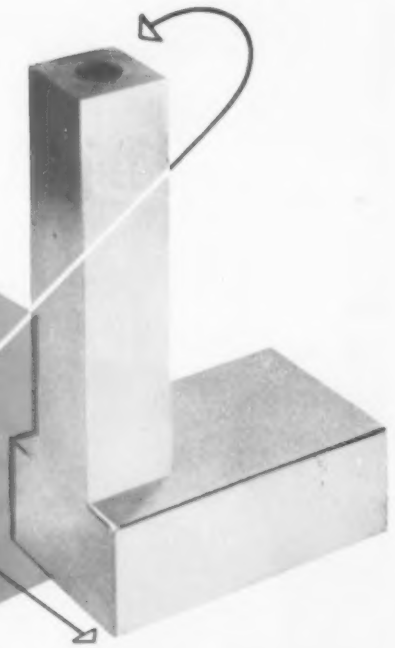
GALLAND-HENNING MFG. CO.
2757 S. 31st STREET MILWAUKEE 7, WISCONSIN

Representatives in Principal Cities

NOPAK VALVES and CYLINDERS
DESIGNED for AIR or HYDRAULIC SERVICE

A 446-4g-B

PRECISION AT *High Speed* GIVES DUMORE THE EDGE



ON SMALL DIAMETER INTERNAL GRINDING

Precision on small diameter grinding calls for high wheel speed — that's why you will find tool and die shops relying more and more on Dumore Precision Grinders for particular jobs like this fuse pin gage. The hole, 1½ inches deep, is given a mirror finish, with a tolerance of ±.0001 in., an easy operation with the Dumore, running at a speed of 40,000 r. p. m.

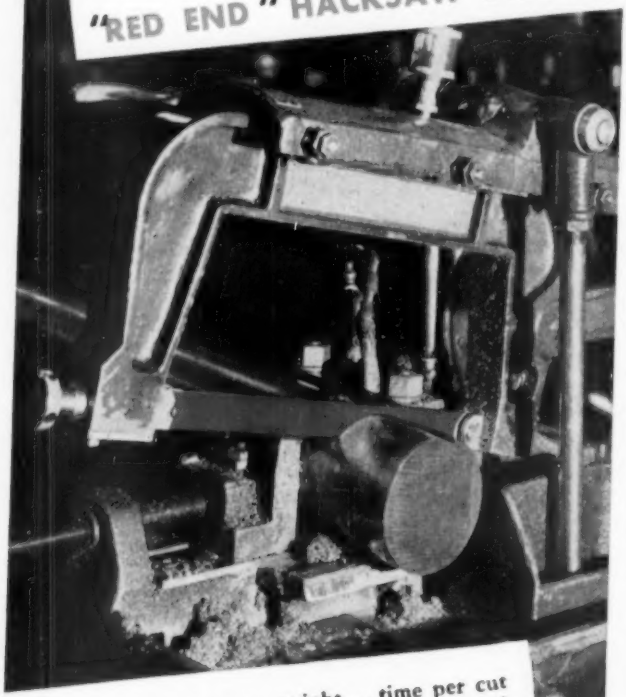
High speed is not the whole story, however. The Dumore Quill is a marvel of precision manufacturing itself, as it must needs be to give smooth vibrationless operation at speeds up to 42,500 r. p. m. Its ability to operate with undiminished precision, for long periods has led to many applications on volume production of the highest quality. Ask your distributor for suggestions on wider use of your Dumore Precision Grinder, or write direct to The Dumore Company, Tool Division, Dept. TH43 Racine, Wisconsin.

Sold by Authorized Industrial Distributors in all Principal Cities

DUMORE

PRECISION AND OFF-HAND GRINDERS

They Saved 15 Minutes Per Cut with Precision-Tensioned SIMONDS "RED END" HACKSAW BLADES



Cuts weren't smooth or straight . . . time per cut was 27 minutes and 15 seconds on 6¾" steel rounds . . . when the Simonds Cutting Engineer was called into this war plant to examine the job. After the correct blade-tension was determined by Simonds' new method, it was possible to double the feed. *Result:* Time per cut shortened 50% . . . and each cut straight and smooth, without ladder-marks.

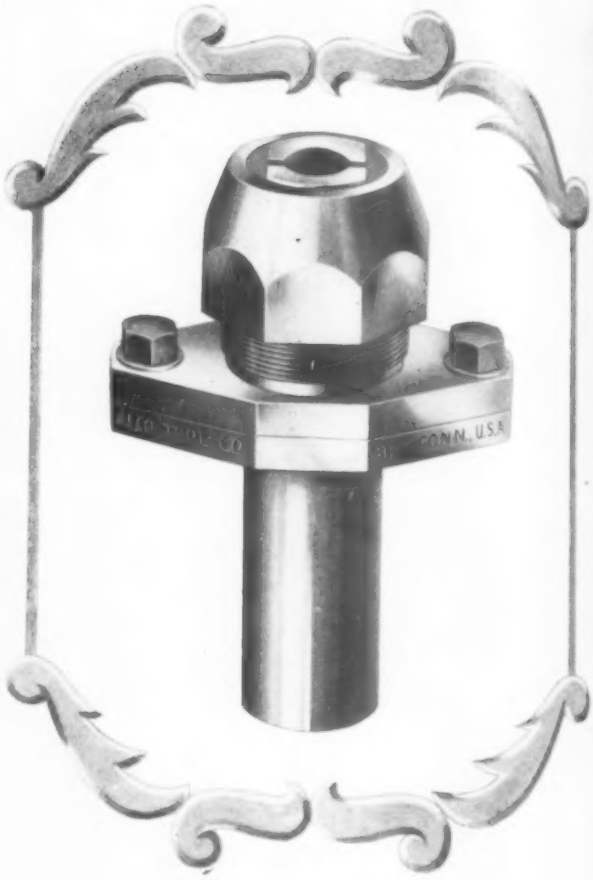
Such results, of course, are not possible in every case. But in a majority of cases, *some* worthwhile improvement or saving results when a Simonds engineer gets a look at the cutting operation . . . no matter whether it's on metal, wood, or other materials. And there's no obligation. Just tell your Industrial Supply Distributor or Dealer to bring the Simonds man to *your* plant.

BRANCH OFFICES: 1350 Columbia Road, Boston 27, Mass.; 127 S. Green St., Chicago 7, Ill.; 228 First Ave., San Francisco 5, Calif.; 311 S.W. First Ave., Portland 4, Ore.; 520 First Ave. So., Seattle 4, Wash.; 31 W. Trent Ave., Spokane 8, Wash.

PRODUCTION TOOLS FOR CUTTING METAL, WOOD, PAPER, PLASTICS

SHORTEN THE WAR . . . BUY BONDS

SIMONDS SAW AND STEEL COMPANY
FITCHBURG, MASSACHUSETTS



ALCO

Screw machine operators find simplicity and accuracy combined to the highest degree in Alco Tool Holders.

The Alco Drill Chuck shown here will fit all makes of screw machines—old or new, and holds Drills, Reamers, Counter Bores, etc. firmly and securely *without the use of bushings.* This feature alone saves hours of valuable time now wasted in making special bushings, and eliminates entirely the necessity for carrying an inventory of possibly 250 bushing sizes. Saves set-up time, too, because the drill is set directly in the chuck and tightened with the wrench.

All Alco Tool Holders have the patented floating feature which insures absolute concentricity. When setting up for the drilling operation, it is simply necessary to center the drill on the work, tighten two screws on the flange, and the drill remains constantly on center.

Each holder expands to take several drill sizes within its capacity.

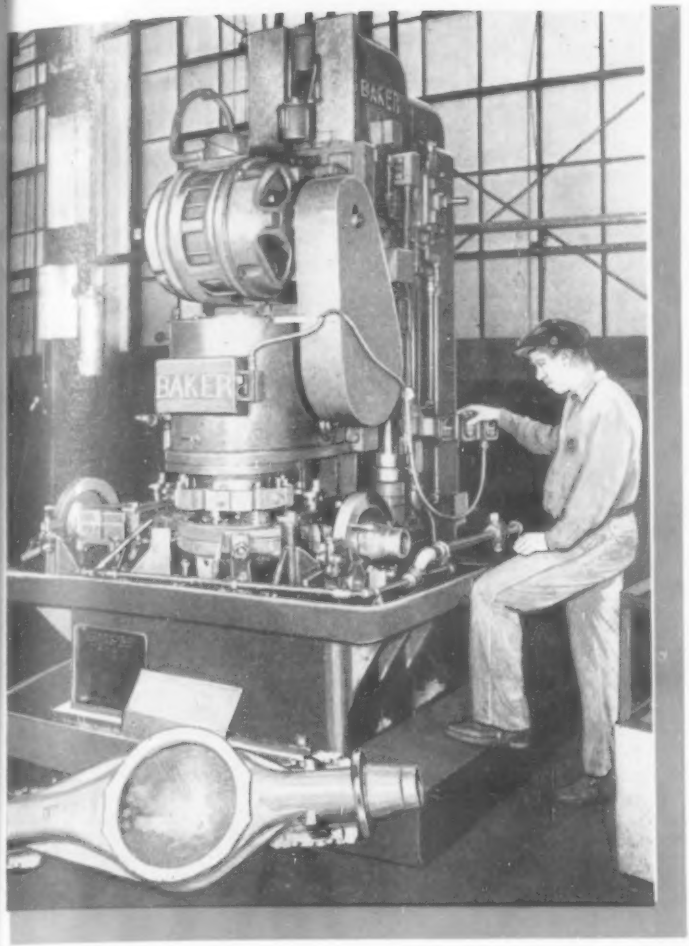
Remember!

No Bushings Needed

Write for Catalog

ALCO EFFICIENT TOOLS

THE ALCO TOOL CO., 453 Birdseye Street, BRIDGEPORT, CONN.
Detroit Office: 908 Stephenson Bldg., Phone Madison 5870
Chicago Office: 6219 So. Kenwood Ave., Phone Hyde Park 6807



A WINNING COMBINATION

BAKER MACHINES AND MACK TRUCKS

★ Building heavy-duty, serviceable prime mover trucks at the Mack Truck Company plant at Allentown, Pa., calls for extra heavy-duty machines like the Baker Model 60-HO-4 shown here. This hydraulic-feed, vertical boring machine is used for boring and sweep facing the banjo surface of the steel casting axle housing.

★ Operations handled on this machine include rough and finish boring and chamfering a 16-inch diameter, and rough and finish facing of a 20-inch diameter. Mack uses two of these machines, with one operator for each, for these particular machining operations.

★ Power and rigidity are built into the Baker machine to remove stock in a minimum of time and to give longer cutter life with less down time for grinding. A 25 hp motor provides ample power to drive the main spindle in rotation through an enveloping type worm and gear.

NOTE THESE BAKER FEATURES

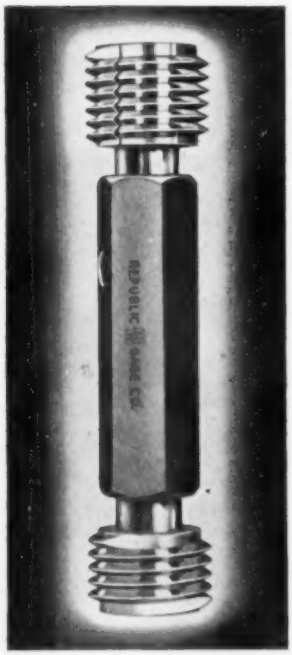
★Heavy cut without auxiliary tooling supports ★ Less operator fatigue, since the automatic cycle is controlled by push-buttons ★ The cycle has a coarse feed for boring and changes automatically to finer feed for facing.

Baker Brothers, Inc. Toledo, 10, Ohio

MACHINES FOR DRILLING • BORING • TAPPING • CONTOUR GRINDING

You Can Get Gages From Stock at Republic Gage Co.

When the demand for standard thread plug gages is urgent, *call on* REPUBLIC GAGE CO. Our stock of carefully selected thread plugs range in sizes from 4-40 NC up to and including 1"-14 NF (class 2 and 3 fit), and are ready for immediate shipment to you. These gages, made from specially heat treated high speed steel and carefully inspected for any error in pitch diameter, lead, or thread angle, are of the very highest quality.



We are prepared to grind any thread form you require. Let us solve your gage problems.

REPUBLIC GAGE

2228 FENKELL AVE. DETROIT 21, MICH.

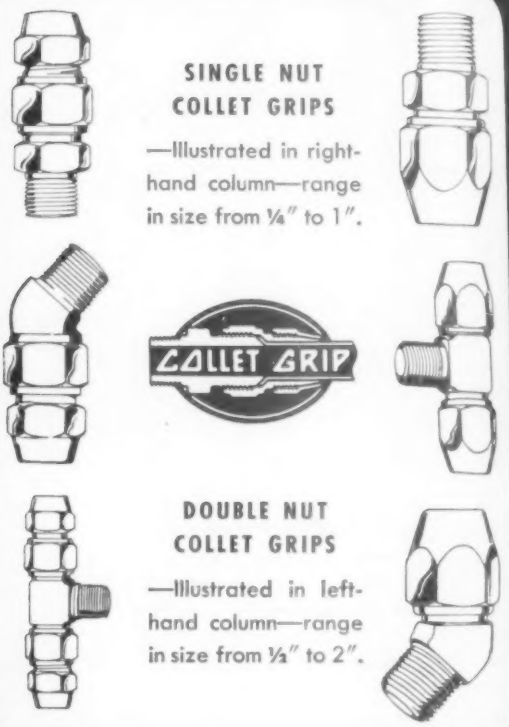
PHONE UNiversity 1-0370

Sizes and Shapes FOR EVERY INDUSTRIAL NEED

COLLET GRIP

seals as it grips

TUBE FITTINGS



SINGLE NUT COLLET GRIPS

—Illustrated in right-hand column—range in size from ¼" to 1".

COLLET GRIP

DOUBLE NUT COLLET GRIPS

—Illustrated in left-hand column—range in size from ½" to 2".

No Threading, Welding or Soldering

Shown above are but a few of the wide variety of single and double nut *Collet Grips*—there is a size and shape for every industrial and hydraulic tube fitting requirement. *Collet Grip's* revolutionary design principle permits repeated use without distortion of threads—assembled or disassembled merely by tightening or loosening compression nut. And, because *Collet Grip* "seals as it grips," positive protection is provided against vibration leaks. Quick, easy, economical installation—without threading, welding or soldering.

Write for Catalog No. 43 which gives complete technical data

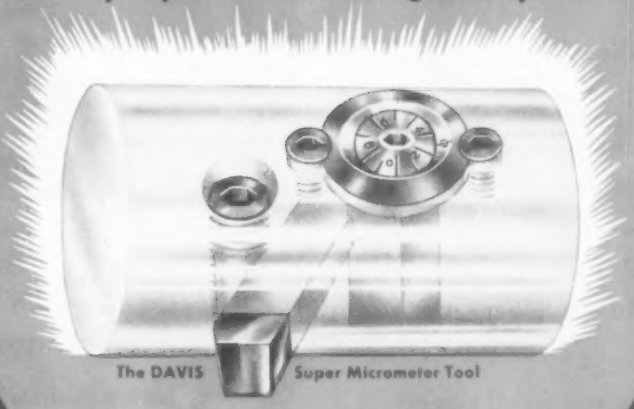
ARMY NAVY

LOGANSPORT MACHINE CO., INC.
Fittings Division
902 PAYSON ROAD, LOGANSPORT, INDIANA

THESE DAVIS PRECISION BORING TOOLS

Set New Records for Accuracy and Economy!

Davis Boring Tools are definitely helping to increase vital war production. In industrial plants all over the United States they have set amazing new standards for *accuracy—speed—inter-changeability—economy.*

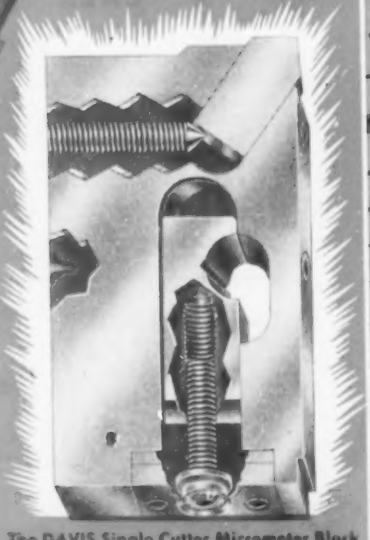


The DAVIS Super Micrometer Tool

Write for Bulletin #500

DAVIS BORING TOOLS

The DAVIS Regular Type Block
Write for Bulletin #301



The DAVIS Single Cutter Micrometer Block
Write for Bulletin #601

DAVIS BORING TOOL DIV. JARKIN PACKER CO., INC., ST. LOUIS, U.S.A.

● Our large stock of die accessories of all kinds assures prompt shipment.

Dowel pins in 163 standard sizes (plus oversizes) ground to exact diameters, carburized, hardened and tempered to case hardness Rockwell C. 60-62 effective to depth .020" and core hardness Rockwell C. 50-54.

Standard and Special die sets in all sizes.

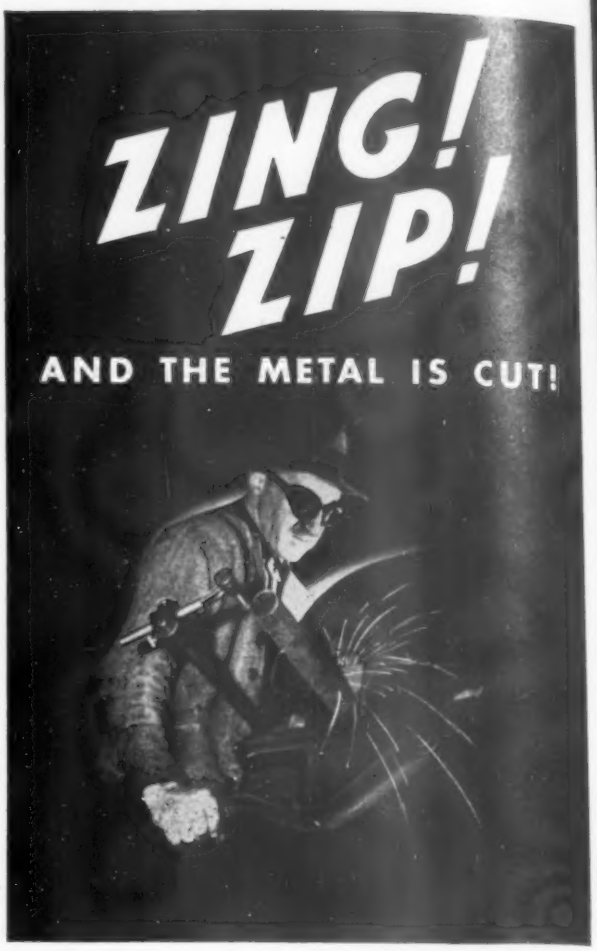
DETROIT DIE SET CORPORATION

2895 W. GRAND BLVD. DETROIT 2, MICH.

★ **CALL "DETROIT"** ★

DETROIT	TR 2-5150
INDIANAPOLIS	LI 3884
MINNEAPOLIS	AT 5264
DAYTON	HE 3042
TOLEDO	GA 5706
SEATTLE	SE 2090
PORTLAND, Ore.	BR 0561
SAN FRANCISCO	MA 8532
NEW YORK	CA 6-1760
BUFFALO	PA 9206
PHILADELPHIA	VICtor 4084

DETROIT DIE SETS ★



It's as easy as that when you cut with this new DeWalt High-Speed Metal Cutting Machine

This new, high-speed DeWalt will out-perform the ordinary types of "light metal" cutting machines you have heretofore been able to buy to do comparable work. It cuts metal fast, accurately, and with greater safety. *And it's built to last.*

One manufacturer, who has a battery of these high-speed DeWalts, is cutting S. A. E. 52100 solid bearing steel into $^{15}/_{16}$" lengths—at the rate of 600 to 650 pieces per hour per machine, using women operators. The machines have already cut 4,500,000 pieces *and are still going strong.*

DeWalt engineering service helped this customer step up service. What is *your* metal cutting problem? We manufacture a complete line of metal cutting machines, and may be able to help you. Call in one of our engineers. Wire, write or phone DeWalt Products Corporation, 6104 Fountain Avenue, Lancaster, Pennsylvania.

DE WALT RADIAL POWER SAWS

LANCASTER, PENNA.

Pictured is a 7″ x 7″ x 1⅞″ compression mold die of *Speed Treat* plate, used on a 60-ton press for making ordnance parts. Cavities are 3″ dia.; wall between cavities .250″; outer walls .375″. Note split construction of male die heads which would be impractical in tool steel (because of tendency to crack), yet over 500,000 impressions have so far been made from a similar set of *Speed Treat* dies. Female die must be removed from press after each impression to remove finished parts. Smaller metal section and lighter weight of *Speed Treat* dies is liked by women operators. *Speed Treat* replaced tool steel costing three times more, yet machinability and finish of *Speed Treat* are far superior and distortion after heat treatment is practically nil.

***Speed Treat* Savings**

66% Lower Material Cost
Better Machinability and Finish
Weight Is Reduced
Better Heat Treatment Response (pack hardening produces an .050″ case and a uniform hardness of 61-62 Rockwell "C")
Heat Treatment Distortion Is Negligible
Danger of Die Breakage Due to Faulty Alignment Is Eliminated
Production Costs Are Minimized

Speed Treat Plate Is The Basic Steel for the Tool and Die Industry

Speed Treat **steel plate lends itself to economical production of plastic dies, all types of mechanical rubber molds, many types of blanking, drawing and forming dies, roller dies, brake dies and miscellaneous jigs and fixtures.**

A .50 carbon *free machining* hot rolled steel plate, *Speed Treat* affords high physical and good hardenability properties formerly found only in expensive grades of special analysis steel.

High tensile strength, free machinability, ready hardenability and constant uniformity are features of Speed Treat plate. It responds excellently to all types of heat treatment.

If you are still tooling up on war jobs or planning your postwar tool and die production, try out *Speed Treat* carbon steel plate now to learn of its many superior economy values. *Speed Treat* costs only one-third as much as water hardening tool steels.

Send for Catalog No. 1243 and the name of your local *Speed Treat* plate distributor

W. J. HOLLIDAY & CO.

"Established 1856"

Hammond and Indianapolis, Indiana

Speed Case*—*Speed Treat **Plate Division, Hammond, Indiana**

Distributors in Principal Cities

Quality Controlled Speed Case and Speed Treat Steel Is Available in All Common Plate Sizes

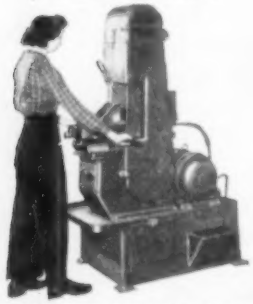
YOURS... for the ASKING!

COMPLETE INFORMATION

about one of the most important Machine Aids to come out in years . .

Wet-Belt SURFACING

- Wet-Belt Surfacing is taking over many tasks formerly assigned to millers, grinders, shapers, lathes, and turning out the work faster—5 to 25 times faster —WITH SUPERIOR FINISH.
- Wet-Belt Surfacing works an entire area, as large as 9" x 17", with one presentation to the belt. Final finish is produced while taking cut. Wet-Belt Surfacing is a precision method—tolerances of .0005" can often be held by ordinary operators. It eliminates dust, heat, discoloring, distortion, flow. It works on any material. It simplifies, and often eliminates entirely, jigs and fixtures. It cuts "set-up" time to a fraction.
- Learn more about it. Mail coupon today for complete information.



PORTER-CABLE
MACHINE COMPANY
1610-8 N. Salina St.
Syracuse 8, N. Y.

Porter-Cable Machine Co.
1610-8 N. Salina St., Syracuse 8, N. Y.
Mail me free booklet, "A New Precision Machining Method."

Name .....

Company ..... Position .....

Address .....

ARMSTRONG
DROP FORGED SETTING-UP TOOLS

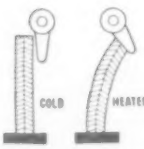
DROP FORGED SETTING-UP TOOLS

This is no time to have men pawing over the scrap pile for makeshift setting-up materials. At any time it's bad shop practice when permanent efficient time saving ARMSTRONG SETTING-UP TOOLS can be picked up from the nearest Mill Supply house. ARMSTRONG Planer, Jacks, Bracing Jacks, Strap Clamps and T-Slot Bolts cut setting-up time to a fraction on Planers, Shapers, Boring Mills, Milling Machines and other machine tools. They assure rigid set-ups, more accurate work and prevent accidents and spoilage. They usually pay for themselves in a single job and give years and years of service. A complete line.

Write for Catalog C-39a

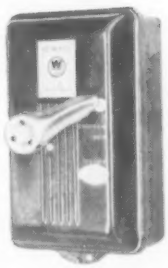
STRONG
ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
360 N. FRANCISCO AVE. CHICAGO, U.S.A.
Eastern Warehouse & Sales: 199 Lafayette St., New York

Wild arcs tamed *Quick!*



CALLING THE TRICK is the job of this Westinghouse Bi-metal Element. Two metals which react differently to heat are bonded together. Threatening overloads cause the Bi-metal to bend, tripping the interrupting mechanism and opening the circuit—*before* any damage is done.

TAMING THE ARC is the job of the "De-ion" arc quencher. It consists of parallel metal plates in the form of a grid. The arc is drawn into the quenching chamber . . . divided into segments . . . smothered between the plates—in the space of a half cycle.



When current's on the rampage, a circuit breaker has to function *fast* and *sure*—every time!

Westinghouse "De-ion" Circuit Breakers are built for just such hair-trigger protective action. They pass harmless overloads without interruption, but let danger threaten, and quicker than a blink of the eye—the circuit's opened . . . the arc is quenched. Burns and pits are minimized; contacts stay cleaner, last longer.

Once the disturbance is cleared, service is instantly restored by a flip of the indicating handle. No waiting—no repairs—no parts to replace.

Protect equipment and circuits with Westinghouse "De-ion" Circuit Breakers. Ratings up to 600 amperes; enclosures for nearly every type of service. Call your Westinghouse Representative today. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., Dept. 7-N.

J-21298

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

"DE-ION" CIRCUIT BREAKERS

SECOMET
DIAMOND WHEELS

Resinoid-bonded **for grinding of carbide-tipped tools in large quantities, or on a production basis. Their extremely fast cutting action provides rapid stock removal. Also for fixed feed, precision grinding operations, such as cylindrical, surfacing, internal and cutter grinding, because of their free and cool cutting action and ability to hold size.**

Metal-bonded **for off-hand grinding, where the cutting surface is sometimes subjected to extreme abrading action.**

Made in all standard types and diameters, in diamond concentrations to suit your requirements.

Catalog on request.

J. K. SMIT & SONS

157 Chambers St., New York 7, N.Y. 6400 Tireman Ave., Detroit 4, Mich.

Ⓚ

YOUR *low-cost* WAY TO TOOL UP FOR No. 0 TO 1" TAPPING

Ettco-Emrick TAPPING ATTACHMENTS

With these comparatively inexpensive Attachments for your drill presses, you are set to handle any tapping in the range of No. 0 to 1" taps at the highest practical tapping speeds, and with all the accuracy and sensitivity any tapping job requires.

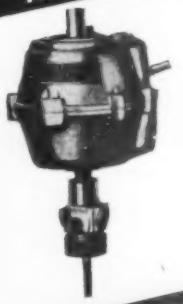
For full details about these Attachments, which have been in succesful use throughout American industry fro over 20 years, write today for BULLETIN No. 2.

FOR SMALL TAPS No. 0 to No. 10

ATTACHMENTS No. 100 No. 200

These two sizes have all parts operating in a pumped oil bath, assuring continuous smooth-running and sensitivity at high speeds so vital with small taps. Asbestos-carbon Cone Clutch—an Ettco-Emrick patented material—gives highly sensitive action and long wear.

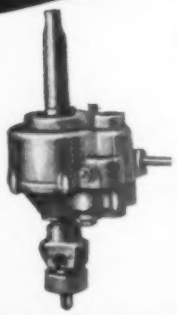
FOR MEDIUM TAPS No. 5 to 1/2"



ATTACHMENTS No. 1-B No. 2-B

An improved tapper, providing higher speed and longer life. Its leather cone clutch is unequalled for sensitive action and wearing properties. Clutch design includes provision for expansion and contraction. A long clutch life is common for these tappers.

FOR LARGE TAPS 1/4" to 1"



ATTACHMENTS No. 3-B No. 4 No. 5

The No. 3-B is designed specially for heavy tapping on light presses. It is geared so that the tap runs at one-third the speed of the drill press spindle. This has the effect of adding back gears to a small drill press. Nos. 4 and 5 are built around a floating amplified pressure multiple disc clutch and a shockless positive reversing clutch. All three sizes have the sensitivity of the smaller tappers.

ETTCO TOOL CO.

586 Johnson Ave., Brooklyn 6, N. Y.

Detroit 1 • Chicago 6

Over 25 years specialization in designing and building drilling and tapping equipment.

A New CENTERLESS GRINDER of Advanced Modern Design

• The new Landis #12 Centerless Grinder is as modern in features and design as it is in appearance. Outstanding among the many features are the simple centralized controls and the separately driven adjustable speed regulating wheel.

Both electric and hydraulic controls are located at a convenient height so grouped that all operations can be controlled quickly and without loss of production time. This contributes materially to the sustained high production possible with the new Landis #12.

The separately driven adjustable speed regulating wheel makes possible new standards of grinding accuracy because of the smooth flow of driving power over the full speed range of the wheel. The best speed for maximum production can be selected without interrupting the grinding cycle.

For complete information on the features of design and specifications of the Landis #12 Centerless Grinding Machine, request a copy of Catalog T44. Write The Landis Tool Company, Waynesboro, Pa., on your letterhead giving name and position. 1A

Grinding wheel feed and main control grouping.

Regulating wheel base is a complete self-contained unit.

LANDIS TOOL Company

LANDIS TOOL COMPANY
WAYNESBORO, PA.

NEW EQUIPMENT

• Materials + Processing •

T.M. REG. BY THE BRAMSON PUBLISHING COMPANY

NEW BAKER MACHINE HAS AUTOMATIC CYCLE (P30)

Baker Brothers, Inc., has developed a multi-operation, two-unit machine of automatic cycle type for handling core drilling, boring, and counterboring operations in right and left hand track links.

Being fully automatic, the machine requires only loading and unloading of parts by the operator. It is arranged with a 4-station power index table, allowing for loading and unloading of two parts at chucking position while the machine is cutting.

The machine consists of a horizontal unit with a multiple-head drill, and a vertical hydraulic feed unit furnished with a heavy-duty 12-spindle head mounted on a large saddle. A new feature, particularly adaptable to heavy-duty, large-size-head machines, is a large feeding cylinder mounted on the center of the index table. Work holding fixtures are mounted on the table, which rotates around the cylinder.

Other features of the machine are accessibility of all major units; Baker tooling with special work holding fixtures, cutter bar holders and cutters, and bush plates; and convenient push-button stations.

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.

FELLOWS DEVELOPS NEW GEAR SHAVER (P31)

Fellows Gear Shaper Co. announces development of a new machine for shaving internal spur and helical gears. This machine operates on the "parallel axes" principle in that the rotary shaving tool and work are held with their axes parallel to each other.

The tool is held on a rigidly mounted spindle which is reciprocated at comparatively high speed. The work is held in a fixture mounted on an adjustable knee, operated by a depth feed cam for bringing the work into contact with the tool under pressure. The tool is rotated in one direction to finish one side of the teeth and then reversed to finish the other side. Reversal of direction is automatic.

Capacities of the machine are: diametral pitch, 6; face width up to 10 pitch 1½"; 12 to 16 pitch 1".

MACHINE KEY BUILT IN THREE PARTS (P32)

The Industrial Machine Key Co., Inc., announces that it has developed a new machine key that saves many hours of production time.

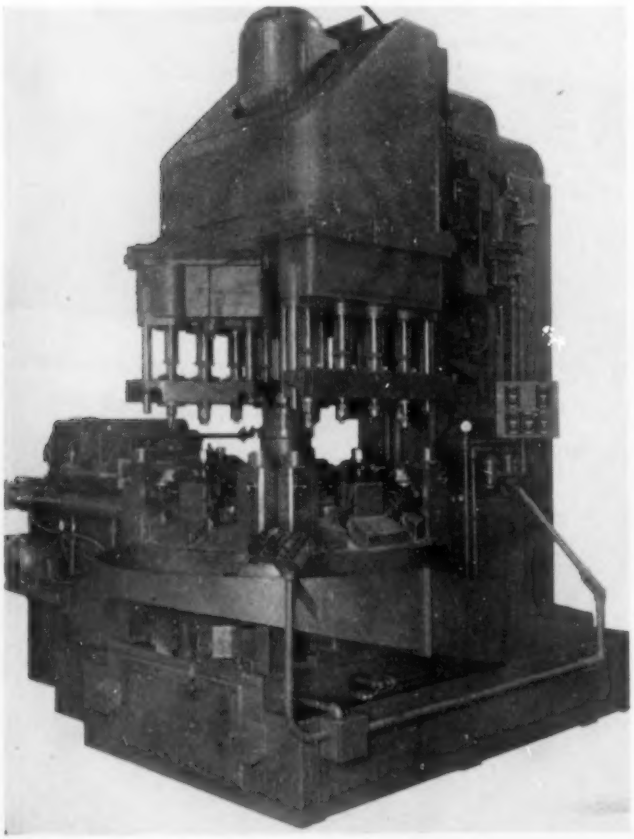
The key consists of three separate units. It is installed by holding back the two side pieces the width of the key and driving the center piece to a solid fit. It is removed by driving in the side pieces and holding back the center piece. Removal requires only a few minutes, and the key may be reused.

DIAMOND TOOL DEVELOPS LARGE BENCH MILLER (P33)

Diamond Tool Co. has announced development of a new bench model miller, said to be the largest bench mill manufactured.

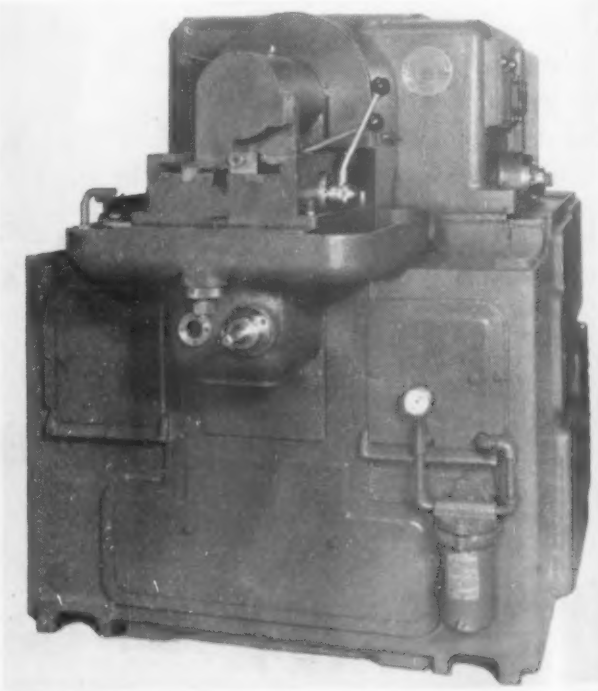
Features of the machine are a 5-⅛" x 20" table with a longitudinal travel of 12", a vertical travel of 9", and transverse travel of 6"; heat treated spindle mounted in taper roller bearings; spindle nose hardened and ground for perfect concentricity and finish, and a needle-type bearing mounted in the overarm bracket to provide friction-

(Continued on page 166)



Left: **New multi-operation Baker machine for performing core drilling, boring and counterboring**

Below: **Internal spur and helical gears are shaved on this recently developed Fellows product**



FREE INFORMATION and SERVICE

Request the information and service you desire and keep your library up-to-date . . .

Copyright 1941 by The Bramson Publishing Co.

THREE FREE SERVICES without obligation

For your convenience these three business reply cards enable you to request quickly

1:
New catalogs — bulletins listed in this issue.

2:
Additional information or bulletins relative to new equipment — new materials or new processes.

3:
When answering advertisements, specific information on problems or company representative's call.

HOW TO ORDER

Simply fill out the card, indicating the information or service you desire, and mail.

Be sure to write, in the square, the identifying number of the catalogs or bulletins covering new products described.

In answering an advertisement, include the name of the advertiser and indicate by a cross if literature is desired or if company representative should call. No stamp is required.

USE THIS CARD

for requesting new catalogs and bulletins listed in this issue.

USE THIS CARD

for requesting additional information or bulletins about new equipment, materials, processes, etc.

USE THIS CARD

when answering advertisements, to obtain specific information on problems, or when you desire a company representative to call.

Write in square, number of item describing one catalog wanted ➔ ☐

NAME

COMPANY

ADDRESS

TITLE

THE TOOL ENGINEER, AUGUST, 1944

Write in square, number of item describing one catalog wanted ➔ ☐

NAME

COMPANY

ADDRESS

TITLE

THE TOOL ENGINEER, AUGUST, 1944

Write in square, number of item describing one catalog wanted ➔ ☐

NAME

COMPANY

ADDRESS

TITLE

THE TOOL ENGINEER, AUGUST, 1944

Write in square, number of item describing one catalog wanted ➔ ☐

NAME

COMPANY

ADDRESS

TITLE

THE TOOL ENGINEER, AUGUST, 1944

PAGE NO.

NAME OF ADVERTISER

☐ Literature ☐ Have Representative Call

NAME

COMPANY

ADDRESS

TITLE

THE TOOL ENGINEER, AUGUST, 1944

PAGE NO.

NAME OF ADVERTISER

☐ Literature ☐ Have Representative Call

NAME

COMPANY

ADDRESS

TITLE

THE TOOL ENGINEER, AUGUST, 1944

Write in square, number of item describing one catalog wanted ➔ ☐

NAME

COMPANY

ADDRESS

TITLE

THE TOOL ENGINEER, AUGUST, 1944

Write in square, number of item describing one catalog wanted ➔ ☐

NAME

COMPANY

ADDRESS

TITLE

THE TOOL ENGINEER, AUGUST, 1944

Write in square, number of item describing one catalog wanted ➔ ☐

NAME

COMPANY

ADDRESS

TITLE

THE TOOL ENGINEER, AUGUST, 1944

Write in square, number of item describing one catalog wanted ➔ ☐

NAME

COMPANY

ADDRESS

TITLE

THE TOOL ENGINEER, AUGUST, 1944

PAGE NO.

NAME OF ADVERTISER

☐ Literature ☐ Have Representative Call

NAME

COMPANY

ADDRESS

TITLE

THE TOOL ENGINEER, AUGUST, 1944

PAGE NO.

NAME OF ADVERTISER

☐ Literature ☐ Have Representative Call

NAME

COMPANY

ADDRESS

TITLE

THE TOOL ENGINEER, AUGUST, 1944

USE THESE FREE REPLY CARDS

They are provided for your convenience in requesting information and service . . . .

FIRST CLASS
PERMIT No. 6691
(Sec. 510, P. L. & R.)
DETROIT, MICH.

BUSINESS REPLY CARD
NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

2c.-POSTAGE WILL BE PAID BY—

THE BRAMSON PUBLISHING COMPANY
2842 W. GRAND BLVD.
DETROIT 2, MICHIGAN

1

Request for:
NEW CATALOGS
BULLETINS
BOOKLETS

FIRST CLASS
PERMIT No. 6691
(Sec. 510, P. L. & R.)
DETROIT, MICH.

BUSINESS REPLY CARD
NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

2c.-POSTAGE WILL BE PAID BY—

THE BRAMSON PUBLISHING COMPANY
2842 W. GRAND BLVD.
DETROIT 2, MICHIGAN

2

Request for additional information and catalogs covering
NEW EQUIPMENT
MATERIALS
PROCESSES

FIRST CLASS
PERMIT No. 6691
(Sec. 510, P. L. & R.)
DETROIT, MICH.

BUSINESS REPLY CARD
NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

2c.-POSTAGE WILL BE PAID BY—

THE BRAMSON PUBLISHING COMPANY
2842 W. GRAND BLVD.
DETROIT 2, MICHIGAN

3

ANSWERING
ADVERTISEMENTS
Requesting:
LITERATURE
REPRESENTATIVE
TO CALL

HERE COMES

Faster Cutting!

THIS little Meehanite man is built of Cooper-Bessemer tool shanks, forming tools and milling cutters. He is helping hundreds of machine shops to cut metals faster.

Tools made of tough, uniform, close grained Meehanite have many qualities. They outlast steel on most operations. Superior to carbon steel, Meehanite tool shanks have superior damping qualities, a better coefficient of expansion and are easier to machine and grind.

Tool shanks, milling cutters and forming tools are available in standard shapes and sizes, and can be shipped promptly on receipt of your order. Special designs to fit your particular needs can be furnished also.

For faster cutting, faster all around production, ask for free samples to test in your own shop. Write for Bulletin No. 53 T-2.

THE Cooper-Bessemer CORPORATION

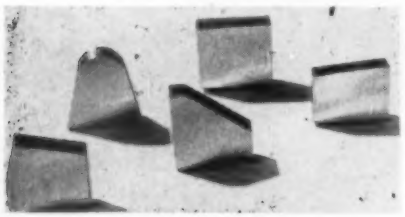
DEPT. E., MOUNT VERNON, OHIO

free support for the arbor. A bracket supporting the jackshaft is arranged for rapid belt shifting and tension adjustment. Spindle speed varies from approximately 100 to 1400 r p m.

ALLOY TOOL TIPS NOW ARE AVAILABLE (P34)

Haynes Stellite Co. announces that tool tips cast from cobalt-chromium-tungsten alloy are available for shops desiring to make their own metal-cutting tools.

The company reports that metal-cutting tools made by brazing these tips to steel shanks are recommended for jobs requiring tools of large cross sections or those that are bent or offset, or in tool holders which make use of solid tools impractical. They also are advantageous on operations requiring considerable overhang of the tool.



Alloy tool tips in standard shapes

Each of the ten standard shapes of tool tips available has the joint faces (bottom and one end) bronze-tinned for brazing. Standard tips also can be furnished without the bronze coating, if desired. Stock is allowed for finish to nominal size.

THREAD MILLER SUITABLE FOR LARGE OPERATIONS (P35)

Development of a new heavy-duty thread miller suitable for any kind of heavy or large work is announced by the Smalley-General Co.

The machine will mill .8 pitch threads 1-¼ threads per inch, 18" diameter, 12-½" long. The milling spindle can be run at any speed between 33 and 100 rpm and can be easily arranged for speeds up to 200 rpm. Turning speeds 125 times faster than the milling speed can be obtained instantly. Rigidity in the arbor is obtained by using a large taper in the end of the main spindle.

Other features cited by the manufacturer are tapered roller bearings on all shafts, heavy bed with renewable ways, hydraulic power traverse, and oil-proof wiring.

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.

NEW GRINDER CARRIES TEN-INCH BELT (P36)

A new 10" wet and dry grinder, weighing over a ton and carrying up to a 10" abrasive belt, has been announced by Hammond Machinery Builders, Inc.

According to the manufacturer, the new grinder will do a better and faster job of finishing on many operations ordinarily done on shapers, milling machines, surface grinders, disc grinders, and similar equipment. The machine handles such operations as deburring, descaling, chamfering, beveling, and

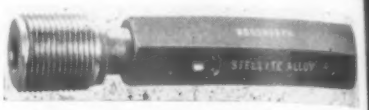
Hammond wet and dry belt grinder

finishing of pads, bosses, and thin sections of castings, forgings, and stampings.

Clearance is provided for getting into corners, and the machine will accommodate various types of tables and a wide variety of special work-holding fixtures for clamping pieces of various shapes and sizes. A built-in, automatic belt tensioning device is said to provide vibrationless operation. Also the grinder operates to within reasonably close tolerances in large volume production.

STELLITE ALLOY GAGES TESTED FOR WEAR (P37)

N. A. Woodworth Co. announces that field and plant tests have shown a five-to-one superiority in service life for its new line of Stellite alloy



New alloy thread and plug gages

plug and thread gages over steel gages of the same type.

Made from dense castings of a new cobalt-chromium-tungsten alloy, the gages have consistently been proved superior in wear and accuracy, the company states. Other advantages cited for the gages are low coefficient of friction, low affinity for other materials, low coefficient of expansion and thermal conductivity, stability, and non-corrosive and non-magnetic properties.

BACK SPOTFACER REACHES INACCESSIBLE PARTS (P38)

Edlund Tools, Inc., announces development of a device for back spotfacing operations on parts where the holes to be spotfaced or countersunk are inaccessible to a standard tool mounted directly in a drill press spindle.

The tool consists of a body casting containing spur gear trains which transmit the rotational movement of the drill press spindle to the spindle in the nose end of the casting, to which the cutter is attached. Unusual smoothness of finish is obtainable because of the rigid mounting of the spindle in a combination of ball bearings and needle bearings to give maximum radial and thrust support, the company states.

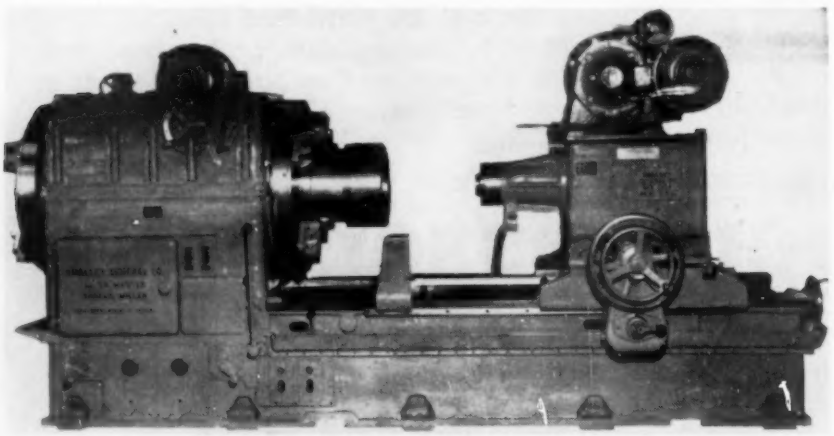
The tool is mounted in any standard drill press like a drill chuck by means of a tapered shank. The manufacturer states that the assembly is so rigid that work can be successfully spotfaced without a pilot if the work is clamped down firmly.

POLISHER DESIGNED FOR HEAVY WORK (P39)

Jones Engineering Co. announces development of a new polishing lathe for heavy-duty work. The unit is designed for bench or stand mounting and employs two contact rolls equipped with fast-cutting, endless abrasive belts.

Designated as No. 143, the lathe is built for two 14" diameter, 3" face contact rolls, has a 1 11/16" diameter shaft, and is 34" long. Spacing between the inside faces of the wheels is 24" with 9" from base to center of the

(Continued on page 168)



Versatile heavy-duty thread miller for any type of large work

IMPROVED PULL-UP BROACHING MACHINES

by

Colonial

8 Models in 6 to 25 tons rating and 36 to 60 inch strokes.

40% overload capacity . . . . Lower operating oil pressure for a given tonnage rating . . . . Minimum floor space—vertical motor mounting within column . . . . Automatic Broach handling . . . . Adjustable broach handling bracket to handle different broach lengths . . . . Puller brackets designed to handle 2 or more broaches . . . . Maximum platen rigidity with well-ribbed broach thrust bracket . . . . Platen removable for re-tooling . . . . Dual safety interlock mechanism . . . . Streamlined for appearance and strength . . . . Automatic lubrication of slide with its hardened and ground gibs . . . . Cylinders integral with both main and broach slides . . . . Plain or latch-type face plates . . . . Swinging locating fixtures with broach interlock available.

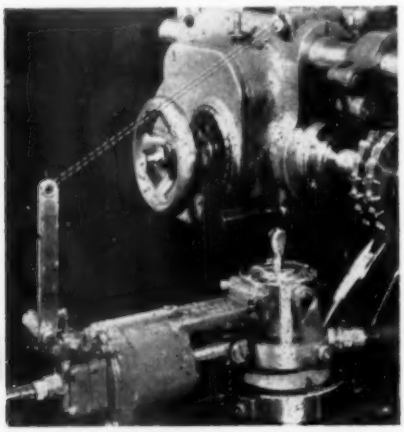
colonial BROACH COMPANY
DETROIT 13, U.S.A.
Broaches Broaching Machines - Broaching Equipment

shaft. It is equipped with a 3-groove V-Belt Motor Shaft and can be used with a 2, 3, or 5 hp motor which mounts underneath the bench or stand where it is free from dust and dirt.

HOLDING FIXTURE GIVES SPEEDIER OPERATION (P40)

Increased speed of operation is the principal advantage cited by Zagar Tool Co., Inc., for its new air-operated holding fixture.

Air is employed only to actuate the locking and unlocking mechanism providing uniform holding power regardless of variations in the air pressure,



Automatic air-operated fixture

the company states. The fixture is readily tied in with the cycle of the machine, making operation completely automatic, and leaving the operator's hands free to load and unload the parts.

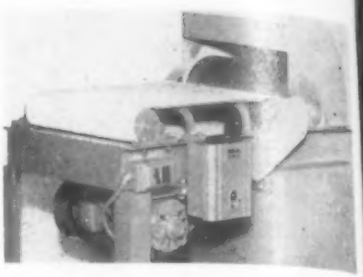
Other features advanced by the company are simple design, easy adaptability to practically any machine, and design involving only one moving part —a piston which has leather washers that are easily replaced.

NEW DISINTEGRATOR POWDERS METALS (P41)

A new disintegrator, which the manufacturer states will disintegrate almost any metal into small multi-fractured chips, has been developed by Franklin McAllister Corp.

According to company, this machine reduces metal to a condition from which it can be converted to a fine powder with one hammermill operation. Cast iron and some other metals can be disintegrated with the machine to a size where no further operation is necessary. In addition to metals, it handles other materials such as rock wool for insulation, concrete, and similar materials.

The unit contains a steel drum containing thousands of teeth on its outside diameter which will disintegrate nearly any material that a steel saw will cut. The disintegrator head can be made practically any size and assembled into almost any machine that best suits the particular product requirements, according to the manufacturer.



Disintegrator for numerous metals

DIAMOND DRESSER TOOL FEATURES EJECTOR HANDLE (P42)

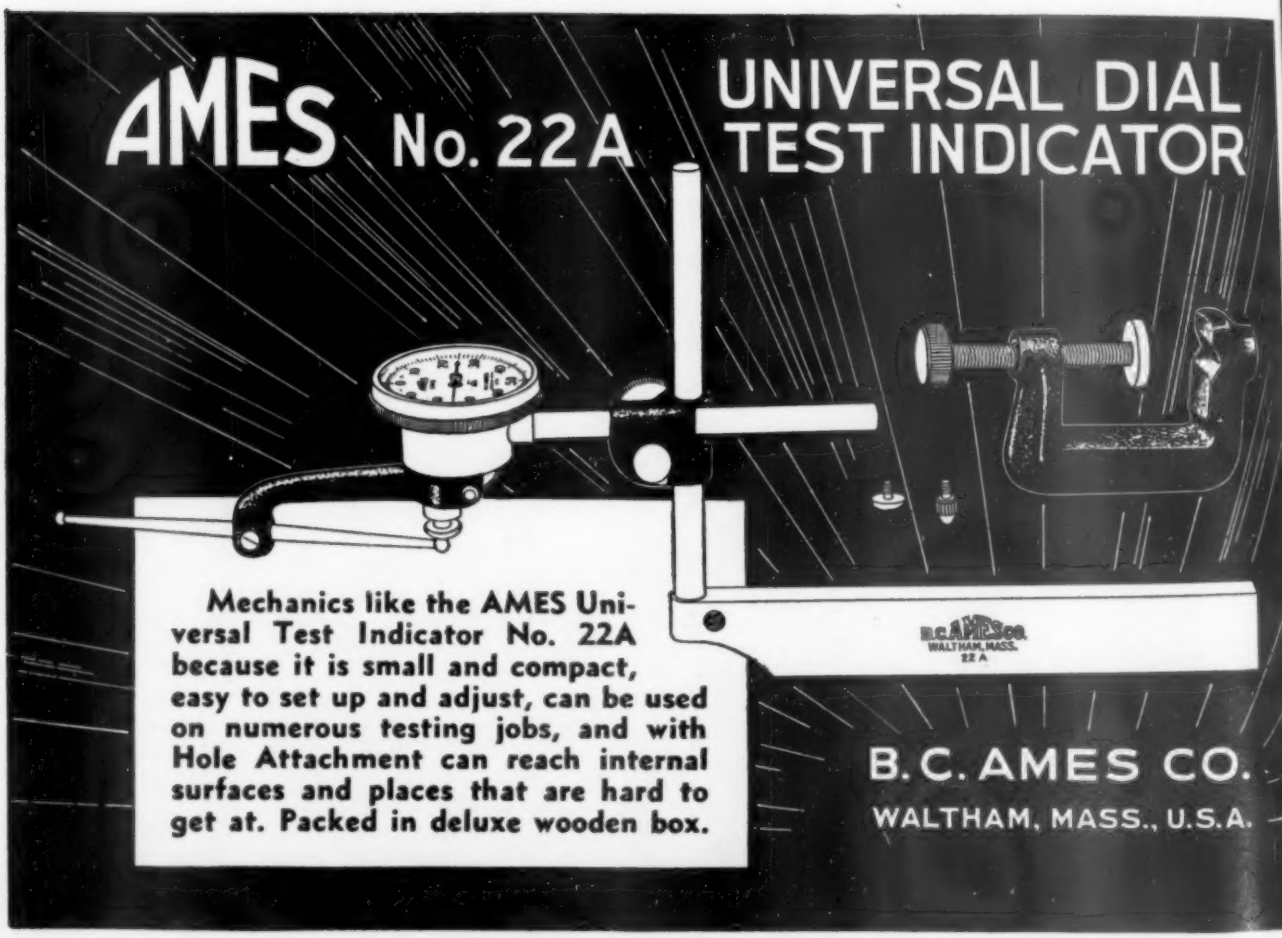
Usable for both hand and machine dressing, a new double-purpose diamond dresser tool known as the "Handl-Nib" has been introduced by the Diamond Tool Company.

The new tool consists of an ejector-type handle in combination with a diamond nib which is held firmly in the handle for use on a steady rest of the grinder wheel. It is claimed that by rolling the diamond across the face of the wheel, a good dress is obtained.

(Continued on page 170)

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.


AMES No. 22A
UNIVERSAL DIAL TEST INDICATOR
B.C. AMES CO.
WALTHAM, MASS.
22A
Mechanics like the AMES Universal Test Indicator No. 22A because it is small and compact, easy to set up and adjust, can be used on numerous testing jobs, and with Hole Attachment can reach internal surfaces and places that are hard to get at. Packed in deluxe wooden box.
B.C. AMES CO.
WALTHAM, MASS., U.S.A.

In the face of production changes and cancellations, high tool inventories are a costly *and unnecessary* risk. TECO Cemented Carbide permits you to keep tool inventories at low levels, while insuring *peak production*. Here's why:

TECO Cemented Carbide does so much more work, fewer replacements are needed. Its extremely hard, dense, uniform structure provides extraordinary resistance to wear and breakage. As a result, it produces more pieces between grinds and stays on the job longer than any other cutting material.

Let these advantages of TECO Cemented Carbide help your war production today—and your postwar profits tomorrow. Have one of our tool engineers discuss your needs. Write for catalog and new price list covering grades, sizes and styles for practically all machining needs.

TUNGSTEN ELECTRIC CORPORATION 570 39th Street, Union City, N. J.

Branch Office: 2906 Euclid Avenue, Cleveland, Ohio

Representatives: Indianapolis, Ind. • Chicago, Ill. • Detroit, Mich.

TECO *Pioneers in Tungsten Carbides for over a Quarter Century* **CEMENTED CARBIDE**

The tool is available with resetable nibs containing diamonds in sizes of two carats and larger.

AIR CLUTCH CONTAINS NO MOVING PARTS (P43)

Smoother, simpler, and more positive action is a principal feature cited by The Fawick Airflex Co. for its new compressed air-operated clutch.

The unit has a rubber gland which expands as compressed air is introduced, thus effecting a union between the driving and driven members of industrial machines. It contains no toggles, arms, springs, levers, or bearings, and requires no lubrication and adjustment since there are no moving parts, the company states.

Air clutch corrects misalignment

Other advantages cited are that the flexibility of the gland insures uniform pressure over the entire clutch face, automatically correcting misalignment of the driving shaft with the driven shaft; air pressure is easily controlled affording smooth starting regardless of load or inertia; and it is equally adaptable to light, heavy, and intermittent loads.

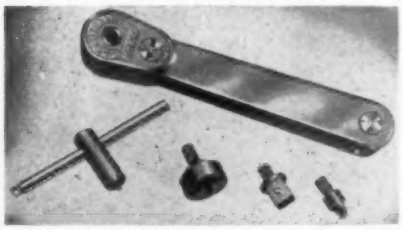
INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.

NEW LIGHTWEIGHT WRENCH HAS TENSION CONTROL (P44)

Combining right and left-hand torque, a new simplified torque wrench which will not overtighten in operation is announced by Aircraft Tools, Inc.

According to the company, positive break-away occurs one notch at a time when the desired tension is reached, preventing slam. Other features include light weight, positive adjustment with all torque load carried on precision ball bearings and heat-treated tool steel parts, and high-grade steel spring to assure accurate torque.



Wrench features tension control

SPINDLE STOP FEATURES EXPANDING COLLET (P45)

Said by the manufacturer to avoid any scarring or burring of headstock walls because of its expanding collet action, a new spindle stop has been introduced by Rieger Mfg. Co.

Spindle stop prevents scarring

The front end of the device is held in

(Continued on page 172)

Eliminate Faulty Tapping and Reaming!

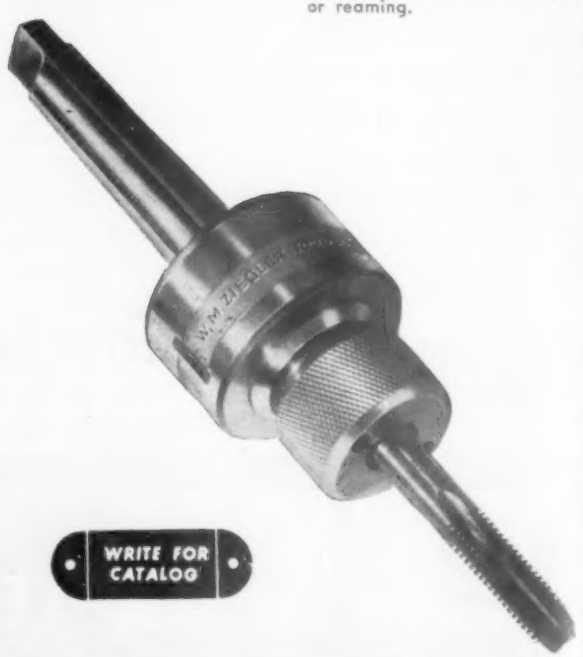
Made To Fit Any Machine

Furnished with male or female taper, straight, threaded or special shanks to fit any machine used for tapping or reaming.

Why put up with the constant annoyance of tapping and reaming jobs coming through with oversize or bell-mouthed holes when it is a very simple matter to correct the situation!

Instead of blaming the trouble on the tap or reamer, why not go to the seat of the difficulty, which is very likely spindle misalignment. Change over to a Ziegler Floating Holder which automatically compensates for inaccuracies in set-up even though they amount to as much as 1/32".

Take a few minutes to figure up what your rejects are costing you each month and you will appreciate the economy of equipping your machines with Ziegler Holders. They also, of course, speed up production, because they shorten set-up time.



Ziegler ROLLER DRIVE FLOATING HOLDER for Taps and Reamers...

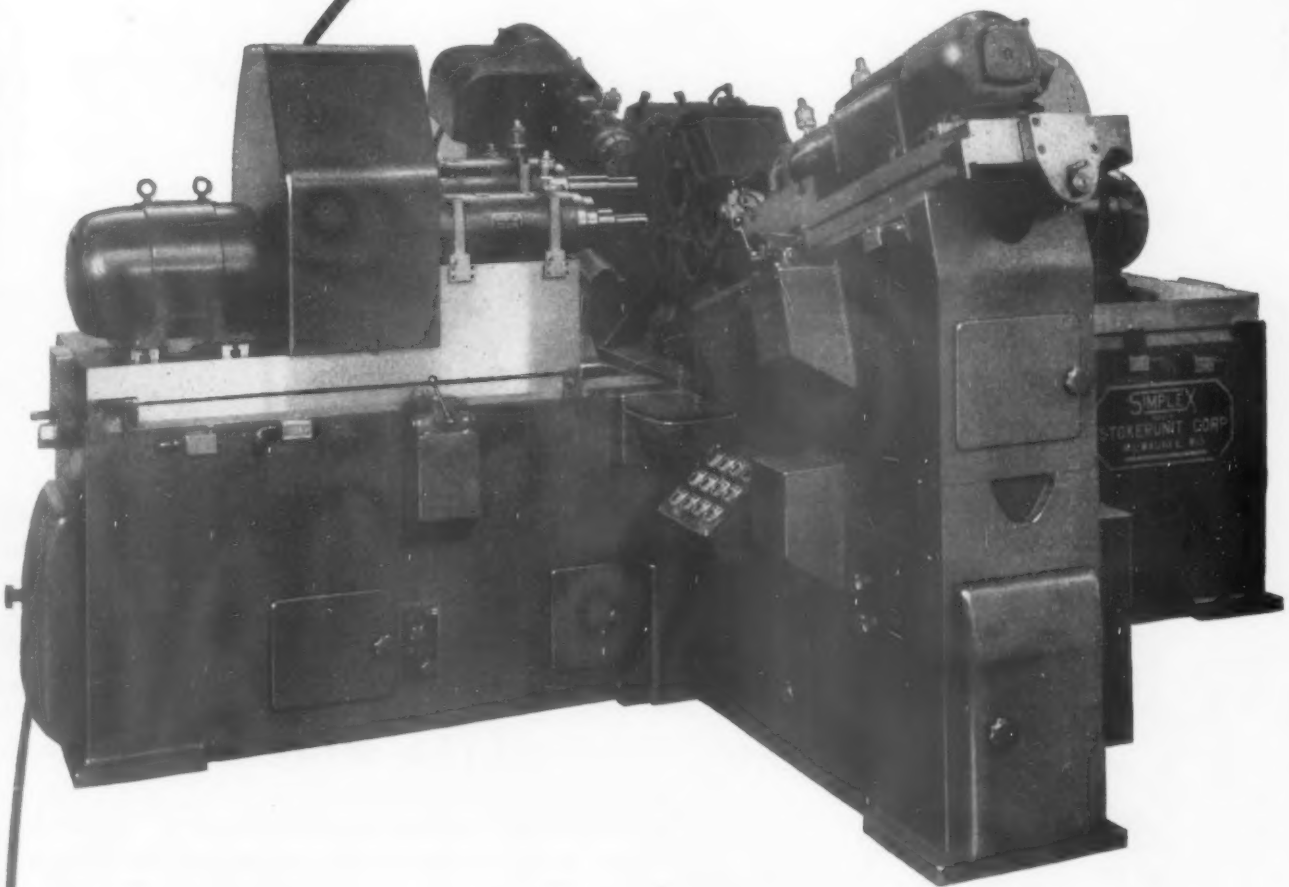
W. M. Ziegler Tool Co.
1920 Twelfth St.
Detroit 16, Mich.

WRITE FOR CATALOG

SIMPLEX

New designs and new materials, fashioned to tolerances never before possible, must be finished rapidly and economically. The new way—a machine with precision spindles, precision spaced, performing all important and correlated operations at one setting of the piece. It may be the answer to your problem now, next month or next year.

This SIMPLEX 2U 4-way 10-spindle Precision Boring Machine has made a production item of an intricate gear case which had been practically a tool-room job —yet it has sufficient inherent flexibility to permit it to be adapted to normal development changes as they occur.



Precision Boring Machines

STOKERUNIT CORPORATION

SIMPLEX Precision Boring Machines and Planer Type Milling Machines

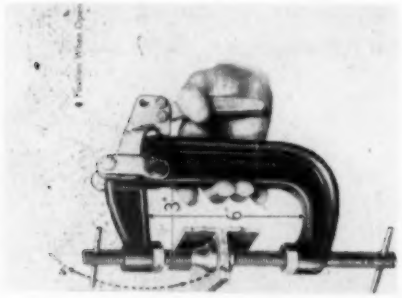
4528 West Mitchell Street, Milwaukee 14, Wisconsin

place with one screwdriver, and turned with another at the rear end which makes the stop expand to tighten itself in the hole of the headstock spindle. It is equipped with a 5/16" x 4" extension for limiting hollow work and for protrusion into the chuck for stopping short pieces. The extension is soft so that it can be turned down to a smaller diameter if desired, and can be removed for positioning solid pieces.

The spindle stop can be used for repeat operations on the lathe and can be utilized with or without a chuck. The standard model is applicable to lathes which have ¾" spindle holes.

TOGGLE-ACTION CLAMP HOLD IRREGULAR WORK (P46)

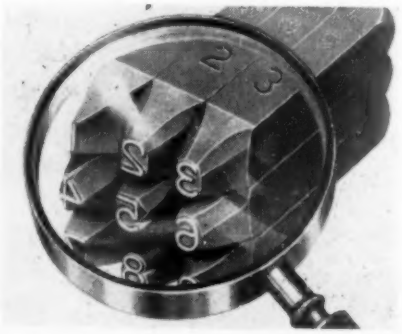
Designed to hold securely a wide range of work, an improved toggle-action "C" clamp has been developed by Detroit Stamping Co.



Clamps irregular shapes securely

Clamping over double angles and other irregular shapes is possible because of two adjustable clamping spindles that grip work at any selected point. Each spindle is locked into place, and retains the setting until manually readjusted. Rapid toggle action provides quick clamping and release, and the entire upper portion of the clamp swings clear of the work when released. The threaded spindles are copper-coated against corrosion.

NEW MARKER FEATURES ROUND-FACE CHARACTER (P47)



Markers with low set-up stresses

Designed for marking parts placed under torsion, tension, or bending, or heat treated parts on which cracks may break out at the point of marking, a new marking device has been developed by Jas. H. Matthews & Co.

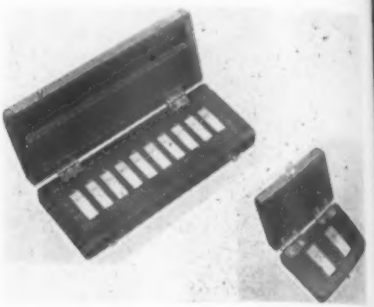
The principal feature of the device is a new type of character engraving with rounded face which provides a minimum of set-up stress. Also it can be supplied in stamps, dies, or type holders to control depth of the mark.

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.

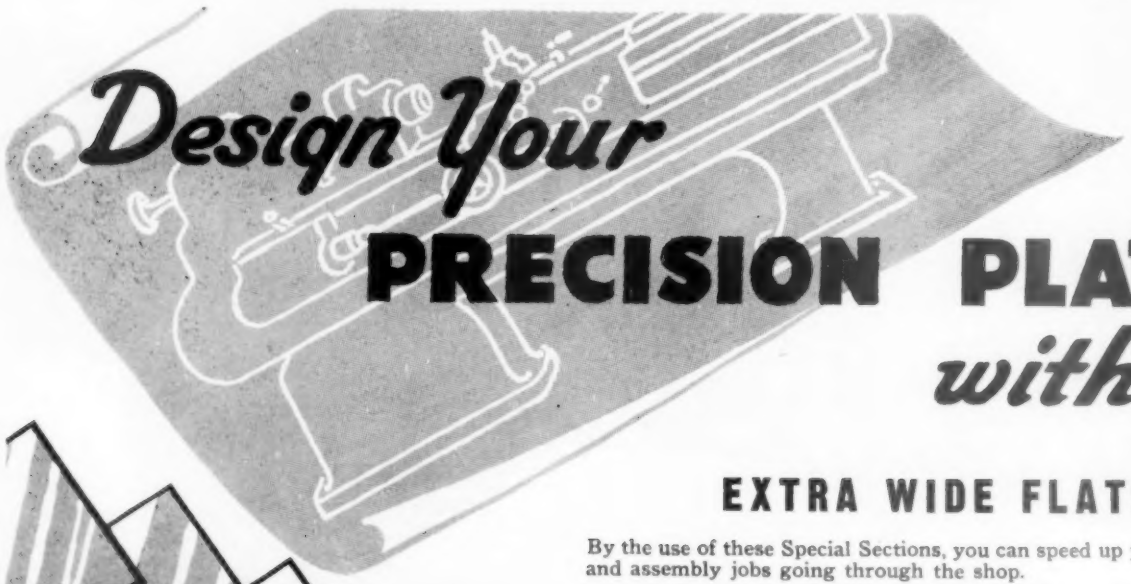
LONGER LIFE CLAIMED FOR CARBIDE GAGE BLOCKS (P48)

Longer accurate gage life is a chief



Carbide set with two wear blocks

(Continued on page 174)



EXTRA WIDE FLATS

By the use of these Special Sections, you can speed up your fabricating and assembly jobs going through the shop.

Production men and tool engineers specify B&L Wide Flats to save valuable time on precision plate work. The accuracy and smooth finish of these Cold Drawn true-square sections mean less machining and faster assembly in a great variety of machine tool construction.

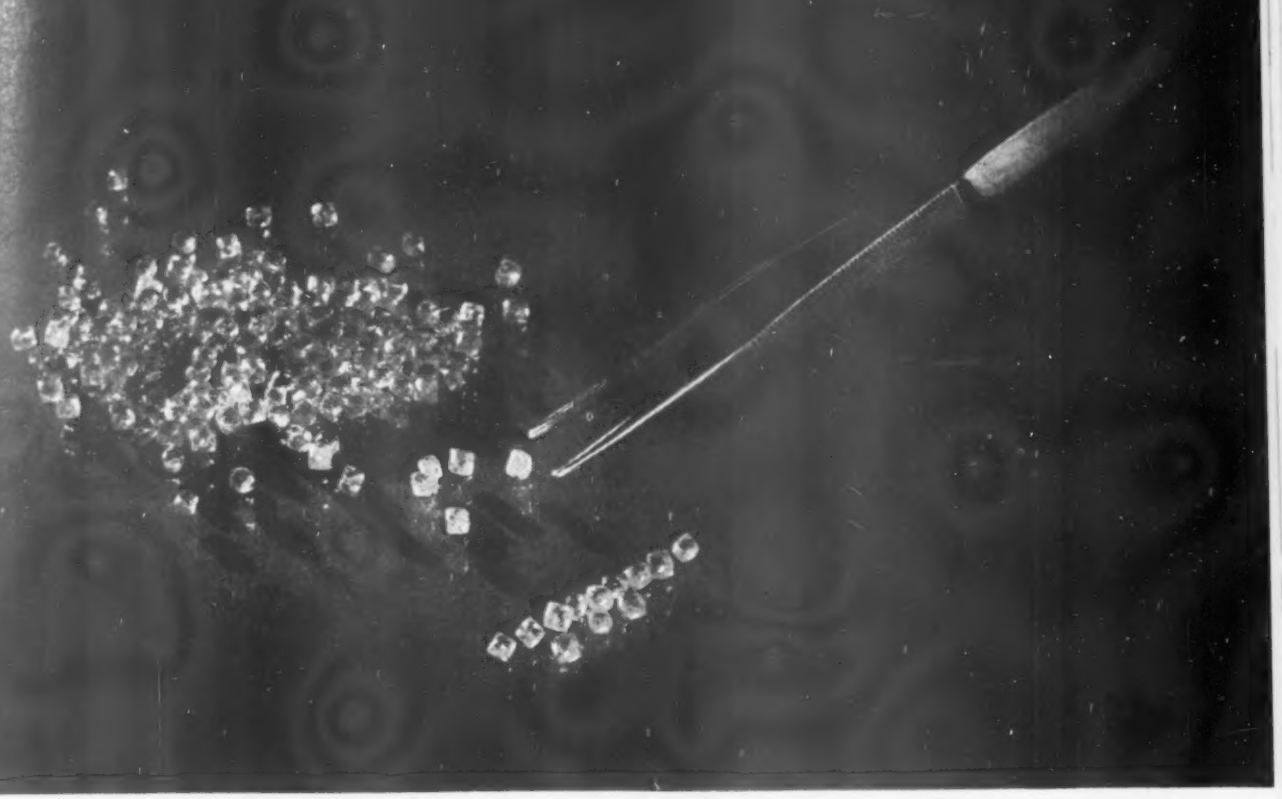
Available in a wide range of sizes for machine bases, pattern plates, jigs, dies and fixtures.

COLD FINISHED STEEL AND SHAFTING

BLISS & LAUGHLIN, INC.

HARVEY, ILL. Sales Offices in All Principal Cities BUFFALO, N. Y.

LIKE TO PICK YOUR OWN *Diamonds?*



Get a selection from Wheel Trueing's big stock . . . choose those you want and get exactly the kind of diamonds you prefer.

While the introduction of highly specialized engineered diamond tools (which Wheel Trueing pioneered) has done much to change buying habits, there are still plenty of diamond-wise production men, purchasing agents and heads of grinding departments who thoroughly understand the characteristics of diamonds, who are competent buyers and who still prefer to select unmounted stones.

Many of these experienced buyers have bought their diamonds from Wheel Trueing for a third of a century or more and in many instances leave the selecting of diamonds for their needs entirely in the hands of Wheel Trueing.

With Wheel Trueing sales offices located strategically throughout the country, it is an easy matter for us to get diamond assortments to you for your inspection and selection and you will find in every Wheel Trueing diamond assortment, the high quality that results in worth-while production economies.

Your inquiry will receive prompt attention.

Send for a copy of our booklet "Tips on Using Diamond Tools." You'll want copies for all your operators.

WHEEL TRUEING TOOL COMPANY

3200 W. Davison Avenue
Detroit 6 • Michigan

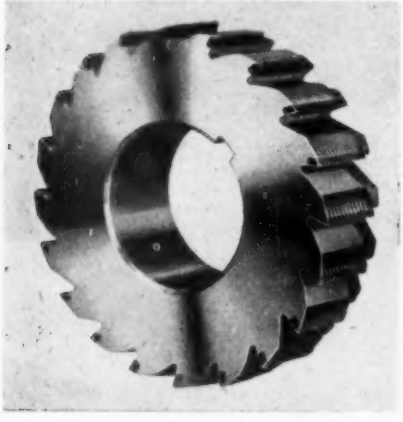
575 Langlois Avenue
Windsor, Ont. • Canada

advantage cited by Jansson Gage Co.

The ten-block carbide set is available ranging in size from .050" to .0509" in steps of .0001". Two smaller sets, one containing two .050" blocks and the other containing two .100" blocks, are intended primarily to be used as wear blocks with steel gage blocks. The company points out that the blocks wring together easily to form combinations. A set of 81 steel blocks with two .050" tungsten carbide wear blocks also is available.

THREAD MILLING CUTTERS HAVE CARBIDE INSERT (P49)

Plan-O-Mill Corp. announces a new line of carbide-insert thread milling cutters. According to the manufacturer the carbide-insert principle provides faster cutting, exceptional finish, accuracy, and longer tool life.



Carbide-insert thread cutters

An additional benefit cited is that tool costs and labor and production expense are reduced because more parts are obtained with each grind. The cutters are available in National, Whitworth, Acme, V, and special forms, ground or unground, with a straight or spiral flutes, and with or without provision for the Higbee cut.

SMALL FURNACE AVAILABLE IN MANY SIZES AND MODELS (P50)

A new line of floor model heat treating furnaces consisting of five basic designs with five or more variations of inside depth to each design, has been introduced by K. H. Huppert Co.

The Model 16 furnace, illustrated here, has work chamber dimensions of 12" wide, 8" high, and 18" deep, with 8" throat. Constructed of 14-gage steel, the furnace body is reinforced on all corners. Heating elements have totally enclosed contacts and connecting wiring is brought through the back of the furnaces into a special compartment. All models can be operated on 220 volts single or three phase line and in many cases can be supplied for special voltages up to 440 volt, three phase. The Series 16 furnaces have a maximum operating temperature of 1850° for continuous operation and 1950° for intermittent use.

New model heat treating furnace

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.

NEW BENDER HANDLES NON-FERROUS TUBING (P51)

Nine hundred to a thousand bends per hour are possible with its new manually operated tube bender, accord-

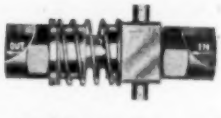
(Continued on page 176)

KEEP MACHINES PRODUCING for Victory

Cam operated
2- and 3-way types

Diaphragm operated
2- 3- and 4-way types

Q. A. W. valves are doing valiant service in war work by promoting faster operation and insuring uninterrupted production. They can be easily adapted to most any pressure control situation. They operate millions of times without loss of efficiency or requiring time out for servicing. Short travel and inherent balance in any position contribute to smooth, lively, easy action. Available in a wide range of types and sizes for practically any application.



Mechanically operated 2-and 3-way actions

Lever operated 2- and 3-way actions

Send for catalog and data book.

C. B. HUNT & SON

1868 E. PERSHING ST. • SALEM, OHIO

QUICK-AS-WINK CONTROL VALVES

THE HIGHER THE PRESSURE AIR WATER OIL THE TIGHTER THE SEAL

WITHOUT QUALIFICATION, NORBIDE TIPPED ROYAL PURPLE* PLUG AND RING GAGES ARE MORE ACCURATE OVER A LONGER PERIOD—AND THEREFORE MORE ECONOMICAL THAN ANY OTHER GAGES OF THIS TYPE...

NORBIDE — REG. TRADEMARK, NORTON CO.

Norbide (boron carbide) approaches the diamond in hardness—yet this is but one reason for its outstanding qualities when used to tip plug and ring gages and other wear parts. Another reason is the fact that this material is non-metallic and therefore cannot charge. It cannot pick up lint, dust or metal particles that might scratch and scrap valuable parts.

Reports like this indicate user's enthusiasm—"measuring cost was 1/11th that of H. S. S." . . . . "275,000 holes plugged without showing measurable wear" . . . . "gage wore only .0001" after measuring 670,000 holes" . . . . "gaged over 500,000 grinding wheel holes—H. S. S. gages wore out after 3,000 holes."

A test of this perfect tipping material will convince you that the New England Royal Purple line of gages, contact points, anvils, etc. offers one of the most economical steps that can be taken by any inspection department.

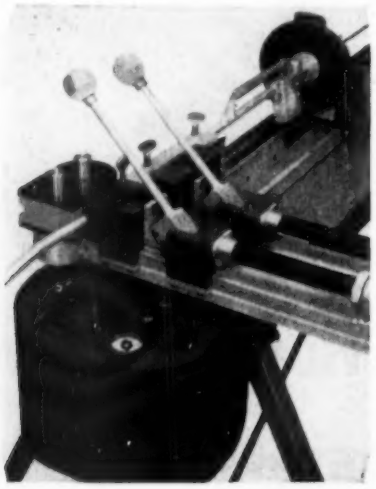
*Royal Purple color is used on the steel shanks of all New England boron carbide products for quick identification.

NEW ENGLAND CARBIDE TOOL CO., Inc.

60 BROOKLINE ST., CAMBRIDGE 39, MASSACHUSETTS

ing to the manufacturer, Leonard Precision Products Co.

The machine will handle non-ferrous tubing from ⅜" to 1¼" O. D. and



900 to 1000 tube bends per hour

will produce from one to ten different bends in a single 9 ft. length of tubing. Bends can be produced to any specified degree of angle up to 180° and at any radial angle. Special models for tubing up to 20 ft. are available. The company states that set-up time of the new machine averages 7 to 15 minutes.

TUBE MARKER HANDLES 16-INCH LENGTHS (P52)

A new tube and coupling marker which facilitates stamping of tubes and couplings from 1" to 16" in length, is announced by M. E. Cunningham Co.

The marker is easily slipped into position, clamping under both ends of the tube or coupling, and locking firmly in place with no further adjustment necessary. It is released by merely lifting up on the handle. It is available for various numbers of characters, depending on size of the marker and characters desired.

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.

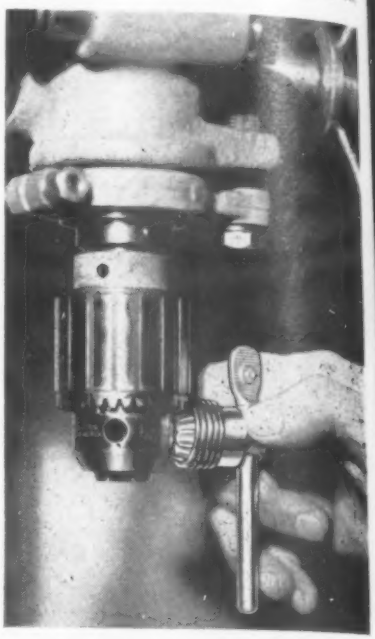
HACKSAW BLADE MADE FOR FASTER CUTTING (P53)

L .S. Starrett Co. announces development of a hand hacksaw blade designed for safe, dependable, fast-cutting performance on hard materials under severe cutting conditions.

Designated as "Safe-Flex" the blade is made of high-speed steel treated to combine a soft, flexible back with a hard cutting edge. It is available in 10" and 12" lengths, the 14 and 18 tooth-per-inch blades having "alternate set" and the 24 and 32 tooth-per-inch blades having a "wavy set."

SAFETY DEVICE EJECTS KEY FROM CHUCK (P54)

Designed to eliminate hazards which occur when machine tool operators neglect to remove the chuck key from the chuck before power is turned on



Safety device ejects chuck key

(Continued on page 178)

NO "time out" for SHUT DOWNS

No Clogging — No Leaking

GUSHER COOLANT PUMPS

Gusher Coolant Pumps are notable for their steady performance — 24-hour-a-day operation. Grit and chips in the coolant pass through a Gusher without the least harm. Having no packing nuts, no metal-to-metal contacts, no relief valves, the Gusher performs without auxiliary strainers. Available in many sizes and types—can be throttled from a mere dribble up to 200 g.p.m. . . . . There is a Gusher model and type for your special needs.

Model TL-7320

See Section 2 of new catalog, indexed for quick reference.

Gusher Pumps — Patented and Patents Pending

Write for catalog

THE RUTHMAN MACHINERY CO.
1815 READING ROAD CINCINNATI 2, OHIO
The "Gusher" — A Modern Pump for Modern Machine Tools

Now! A Matthews Holder for Acid-Resisting or Conventional Printing Type

The "Sure-Set" HOLDER

"Sure-Set" Adjuster, Plastic, Applies Desired Pressure
Slotted Construction Prevents Binding or Distortion of Type
Type Cannot Fall Out of Holder End
Contour Rounded and Tapered for Comfortable Hand Fit
Taper Allows Full View of Type for Marking Limited Areas
LOGOTYPE for Acid Etching or Conventional Printing
SINGLE CHARACTER TYPE Supplied in Letters, Figures or Symbols

Matthews new "Sure-Set" Holder, of polished black plastic, fills a need for industrial stamping applications, where acid etching or conventional inks are used to secure a printed impression. Also, where band stamps, ordinary friction type holders, or individual hand stamps are now used. Made in three sizes for holding characters from 3/64" to 1/2" in size. Holds two or more lines of type, if desired.

Write for literature

JAS. H. MATTHEWS & CO.
3945 Forbes Street Pittsburgh 13 Pa.
Branch Plants
New York, Boston, Chicago, Philadelphia, Newark, Syracuse
District Sales Offices
Cleveland Detroit Hartford Birmingham

An "Extra" with Every Besly Tap!

For 50 years Besly engineers have been constantly refining their designs, working toward the modern line of Besly Taps. Today, with the regular Besly line at a peak, Besly engineers are designing special taps to meet wartime demands for new tolerances, new metals. These "specials" supply a breadth of experience that many times provides refinements in design and manufacture of Besly's "regulars".

When you specify Besly you get taps that are precision made of the finest materials, that cut longer, truer and cooler, that are designed for rapid chip clearance—plus the "extra" of Besly engineering experience and Besly service.

If you have a tap problem, don't hesitate to call on your nearby Besly engineering representative. He is prepared to work with you on the solution, without obligation.

Write for Catalog No. 67—a compendium of useful knowledge for tap users.

BESLY

BESLY TAPS • BESLY TITAN ABRASIVE WHEELS
BESLY GRINDERS AND ACCESSORIES

CHARLES H. BESLY AND COMPANY • 118-124 N. Clinton St., Chicago 6, Ill. • Factory: Beloit, Wis.

NOW YOU CAN DRILL HARDENED STEEL

with "HARDSTEEL" *Drills*

These are just a few of the many uses for "HARDSTEEL" drills — the drills that drill steel hardened by any method without annealing.

1. **Drill holes in full hardened dies.**
2. **Drill holes in armor plate.**
3. **Remove broken set screws on a drill press.**
4. **Start holes in case hardened parts.**
5. **Enlarging holes in hardened parts to accommodate last minute changes.**
6. **Drill spring steel after tempering.**
7. **Drill parts after hardening to avoid warping or distortion.**
8. **Drill production parts after hardening to speed matching at assembly.**
9. **Drill work-hardening materials.**
10. **With a slight change in point grinding, drill hard carbon and plastics.**

To save time and speed production on dozens of jobs, all you need are a drill press, a "HARDSTEEL" drill and the "know-how" given in detail in the "HARDSTEEL" Operators Manual. It tells recommended speeds, how to grind these drills on an ordinary wheel, when to use coolants, how to use drills for countersinking and counterboring and a wealth of similar information. Write for your copy today.

"HARDSTEEL" TOOLS

"HARDSTEEL"

TOOL BITS

and TOOL TIPS are made of the same special "HARD-STEEL" alloy to speed production when machining tough steels, scale covered forgings and the abrasive copper and light metal alloys.

"YOU HARDEN IT — WE'LL DRILL IT"

BLACK DRILL CO. • Division of BLACK INDUSTRIES
1400 EAST 222nd STREET • CLEVELAND 17, OHIO

"HARDSTEEL"
DRILLS · TOOL BITS · SPECIAL TOOLS

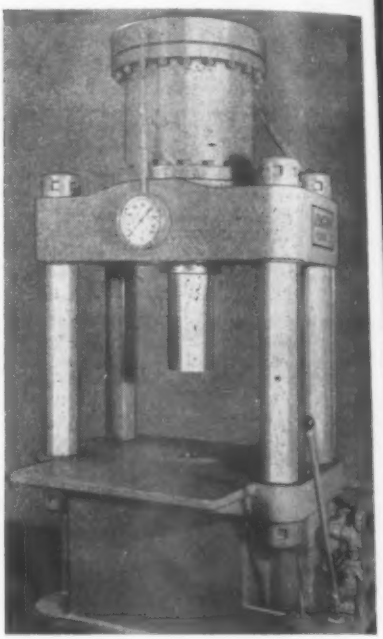
a new safety device, called the "Kee-Jector", has been developed by Safety-Specialties.

The device acts as a guard on the chuck key on any size drill press or lathe and ejects the chuck key the moment the drill or lathe is tightened. The company states that it is impossible to leave a chuck key engaged when the device is used.

NEW PRESS DEVELOPED FOR HEAVY OPERATIONS (P58)

Developed for heavy forcing and forming operations and adaptable to a wide variety of jobs, a new special four-poster tie rod type hydraulic press has been announced by Logansport Machine Co., Inc.

The machine has a maximum ram opening of 30" and a 15" stroke. Low-pressure operation during the non-forcing portion of the operating cycle and high pressure during the actual forcing portion of the cycle are provided automatically by a dual-volume hydraulic pump. A special platen extension is provided to facilitate loading and unloading.



Loading and unloading facilitated

HYDRAULIC PRESS HAS WIDE RANGE (P56)

Designed for general shop use or for conversion from one type of operation to another, a new line of 1, 2, and 4 ton hydraulic presses in both bench and base types has been developed by Colonial Broach Co.

The presses may be used for assembly work, or for push broaching or pull

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.

(Continued on page 180)

P-38's Get Wings *Sooner* when SKILSAW is on the job!

Weber Showcase & Fixture Co., of Los Angeles, sub-contractor to Lockheed, uses SKILSAW Model "825" for fast, accurate skin splitting before applying reinforcing members to leading edge of wing sections for famous P-38's.

SKILSAW MODEL "825"

Here's another example of how war production speeds up when smart engineers put SKILSAW to work.

Fast, accurate skin splitting was a tough problem at Weber Showcase & Fixture Co.—until Weber Engineers solved it by putting SKILSAW Model "825" into a specially designed jig. Now, wings for P-38's roll off the assembly line faster, because SKILSAW is saving *time and manpower* on an important step in production.

Industry everywhere has found that SKILSAW is a most efficient cutting tool, with or without a jig. SKILSAW is powerful, compact, light in weight, easy to use. It goes right to the work, saves steps, saves material handling. A quick change of blades prepares SKILSAW for dozens of cutting jobs in metals up to 16 gauge, or for fast sawing of wood, plastics or compositions.

PLANNING FOR AFTER-THE-WAR?

Let Skilsaw Field Engineers help you now to plan "tooling-up" for peacetime production with Skilsaw's new post-war tools.

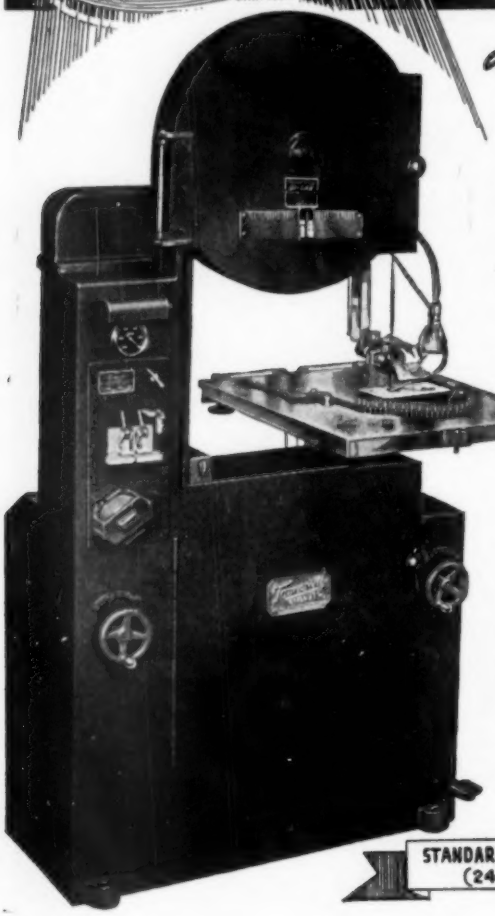
SKILSAW does so many cutting jobs *better* that you can't afford to be without it, for both production and maintenance. Your distributor will gladly demonstrate SKILSAW on your own work. Call him today!

SKILSAW, INC.
5033-43 Elston Ave., Chicago 30, Ill.
Sales and Service Branches in All Principal Cities

SKILSAW PORTABLE ELECTRIC TOOLS
MAKE AMERICA'S HANDS MORE PRODUCTIVE

INVESTIGATE Tannewitz DI-SAWS

and You'll Want No Other!



A broad statement? Yes. But soundly founded on facts—the experience of numerous large manufacturers — the actual performance records of the machines, themselves — and fundamental superiorities of design and construction.

Larger wheels (24" diameter on the standard models) provide greater traction, faster, straighter cutting, more production. Transmissions, common source of die saw grief, never fail in TANNEWITZ DI-SAWS.

STANDARD MODEL No. M24 (24" WHEELS)

Sturdier, heavier construction throughout, plus many refinements of design, make these machines the greatest, trouble-free producers in their field. It pays to buy the best!

With a TANNEWITZ DI-SAW you can do in minutes jobs which require hours by the shaper, miller or lathe methods.

Get the complete facts. Just write for DI-SAW bulletin.

Other Models to Handle Work of Practically Any Size

Made with 30", 36", 48" and even larger throat capacities if desired, the TANNEWITZ "Big Bertha" models make available the tremendous savings of inside and outside sawing, filing and polishing on dies, jigs and other work of practically any size. Write for bulletin.

On request: Bulletins on Single and Variable Speed Foundry Band Saws; Sheet Metal Cutting Band Saws.

THE TANNEWITZ WORKS, GRAND RAPIDS, MICH.

broaching, and may be converted from bench to pedestal types or vice versa.

Platens are counterbored concentric with the ram, permitting ready installation and locating of fixtures in line with the ram movement on the machine. The base below the platen is slotted and relieved to permit ready use of the press for assembly work.

Colonial hydraulic press

The machine is driven by direct-drive electric motors vertically mounted in the column to furnish power for the hydraulic operating mechanism. Stop collars are provided for easy alteration of strokes.

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.

SAW AND FILE ATTACHMENT FOR ELECTRIC DRILLS (P57)

A new attachment for electric drills said to provide a portable power saw and file is now being produced by The Chicago Precision Equipment Company.

According to the manufacturer, the new device will cut every kind of metal, casting or rod, wood and plastic, by placing an ordinary hack-saw blade in the holder with the teeth toward the operator. It may also be converted into an automatic file by simply inserting a file in the same chuck or holder.

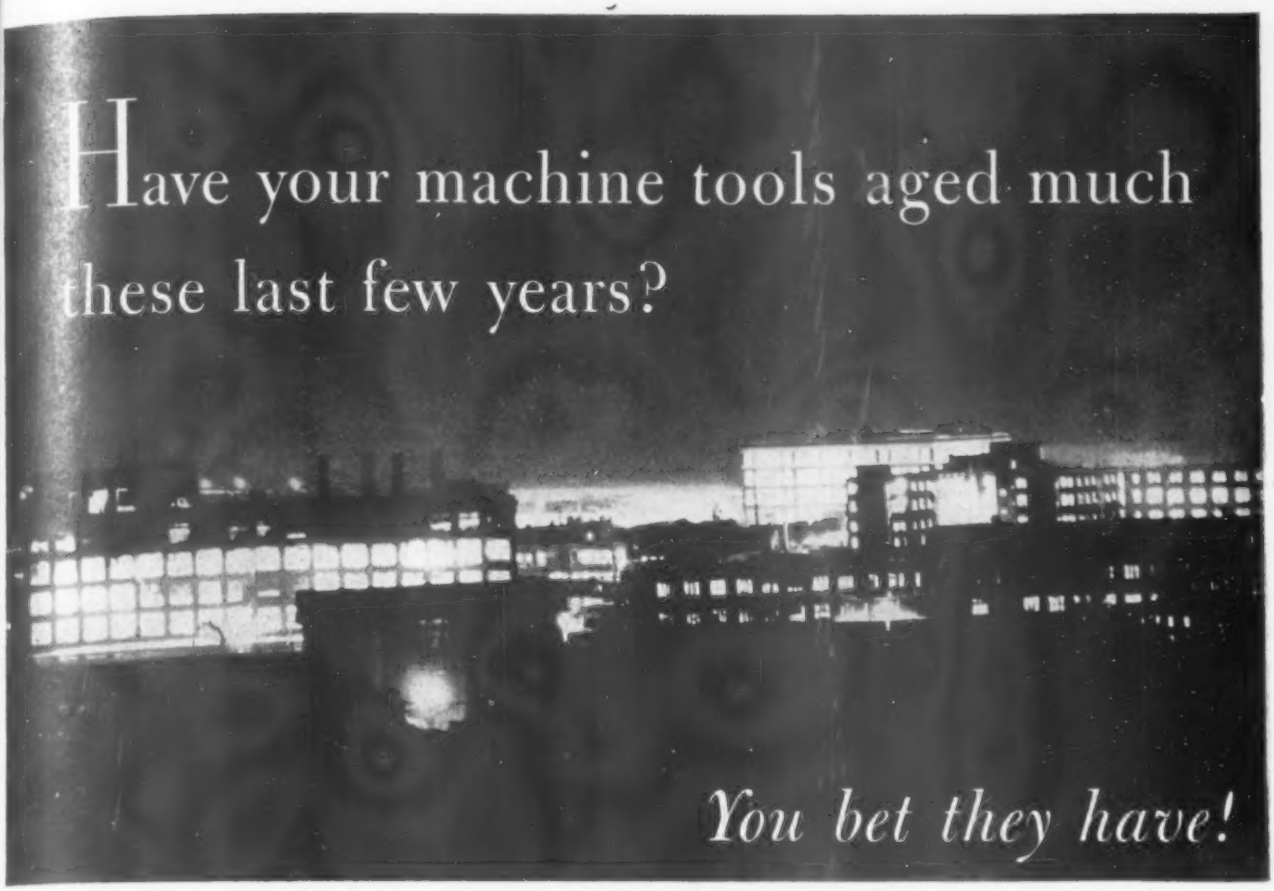
When electric power is not available, the unit can be operated by attaching to an airline or flexible shaft.

NEW LINE OF DIAMOND TOOLS IS ANNOUNCED (P58)

A full line of diamond tools, companion to its Super-Cut Diamond Wheels, is being marketed by the Diamond Division of Industrial Abrasives, Inc.

Twenty-two of the new tools are available in a variety of types to fit all standard grinding machines and individual uses, the concern has announced. Features claimed for the tools include individual selection and expert setting of stones, as well as guarantee on correct grade and weight.

THE END



You're doing a lot of *thinking* about reconversion...*planning* to get ready for the problems ahead.

Then, why not start right on the floor of your plant? There you will find one factor you can definitely *evaluate and act on now:* your present machine tools. Operating the clock around, often in the hands of unskilled labor, they have compressed years of wear into months, without "time out" even for routine maintenance.

Isn't it logical, then, to take a "physical inventory" of the condition of your equipment and to initiate a systematic program of rebuilding, now?

Many leading manufacturers are doing just that, "furloughing" a few machines at a time and calling on the Simmons Machine Tool Corporation to see the program through.

With thirty-five years of ENGINEERED REBUILDING experience to draw upon, Simmons engineers have developed techniques that not only restore a worn tool to its maximum efficiency, but often "build-in" new utility beyond the originally designed capacity. Lengthened beds or tables, widened housings, special motors and gear transmissions and other labor saving devices, for example.

Result: More efficient and economical plant operation, a vital consideration for the competitive post-war economy.

Have you an unusual rebuilding job? Simmons extensive facilities are adapted to the rebuilding of *any type of machine tool up to the largest sizes.* Simmons has completely rebuilt gun lathes weighing 990,000 pounds each ...the heaviest car wheel lathes, boring mills and planers for leading railroad shops...machine tools of every type and size for steel mills, automotive plants, shipyards and aircraft factories.

Add machine tool rebuilding to your reconversion agenda. You can start today by sending us a list of the machines that require rebuilding. We'll be glad to show you how "The Simmons Way" will facilitate your program.

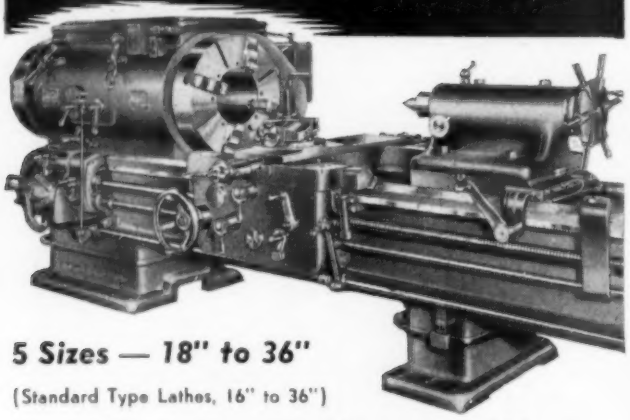
President

SIMMONS MACHINE TOOL CORPORATION
1810 NORTH BROADWAY, ALBANY 1, NEW YORK

SIMMONS *Engineered* REBUILDING

HYDRATROL LATHES

Large Hollow Spindle Type



5 Sizes — 18" to 36"

(Standard Type Lathes, 16" to 36")

There are many jobs today which undoubtedly could be ***better*** done on this machine . . . Investigate!

Lehmann MACHINE CO.

CHOUTEAU AT GRAND • ST. LOUIS 3

LEACH External Grinder

PRICE

Fully Equipped

$875.00

Grinds Work from 3/4" to 11" in length and from 1/8" to 7" in diameter

Send for Descriptive Literature

EXCELLENT DELIVERIES

Our dealers will help you fill out necessary priority forms. Write us today for your nearest dealer's name and address.

Exclusive Selling Agents

H. LEACH MACHINERY CO.

387 CHARLES ST. PROVIDENCE, R. I.

Agents in all Principal Cities Throughout the World

THE IMPROVED NIELSEN LIVE CENTERS

★

Load capacity 200 to 40,000 lbs. at 100 rpm

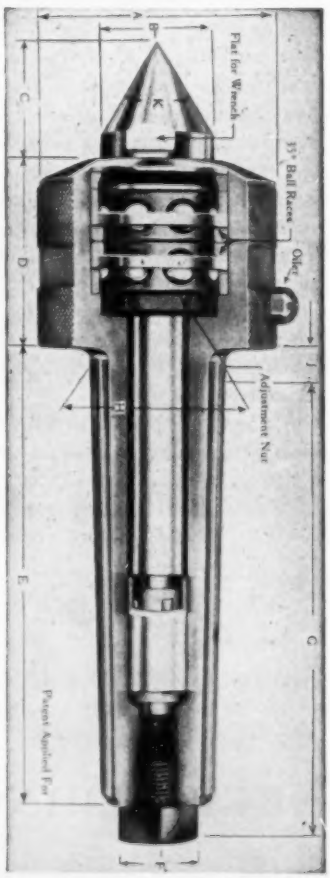
Have adjustment to take up wear and preload bearings

•

Standard Morse Taper No. 2 to 6 in stock

★

WRITE FOR CATALOG



NIELSEN
INCORPORATED

LAWTON • MICH.

"SUPER-KOOL" "81X"

Thred Kut "99"

Stuart Grinding Oils

"Excelene"

. . . for Top Efficiency in Thread Grinding

STUART Thread Grinding Oils are in wide use, giving unequalled efficiency at nominal cost. Developed in co-operation with leading manufacturers of thread grinding machines and wheels, they have been proved in many of the largest and most modern metal working plants . . . A Stuart Oil Engineer will gladly help you achieve top efficiency in thread grinding. Ask him to come in.

For All Cutting Fluid Problems

D. A. STUART OIL CO.

Chicago, U.S.A. • LIMITED • Est. 1865

Warehouses in All Principal Metal Working Centers

WIRE ROPE CUTTER

Hand Power

•

Lever Action

•

Weight 110 lbs.

•

Price $80.00

•

Immediate shipment from New York stock.

Lewthwaite No. C

The compactness and durability of this tool make it particularly adaptable for shipyard or field work.

All tools are thoroughly tested before leaving our plant.

Catalog No. 8 on request

T. H. LEWTHWAITE MACHINE CO.

307 E. 47th Street, New York 17, N. Y.

MANHOURS SAVED

Many firms have found a decided savings on manhours employed by the use of our complete engineering services

•

DESIGN and MANUFACTURE OF

TOOLS
DIES
JIGS
GAGES
FIXTURES
SPECIAL MACHINERY
PRODUCTION PARTS

ADVANCED WITH ADVANCE

Wire, Write or Phone POPlar - 5634

ADVANCED TOOL DESIGN CO.

Room 501-2, 1649 N. Broad St.
PHILADELPHIA 22, PENNA.

For War Birds . . . for your Peacetime Products

. . . the same extra endurance, extra margin of safety—with Ampco Metal Parts

Your nearest Ampco field engineer can help you . . .

Many pre-war standards of mechanical performance are obsolete today. The success of your post-war products depends on keeping pace with such wartime developments as the wider use of Ampco Metal production parts . . . By using this superior alloy of the aluminum bronze class at critical points — where there is wear, impact, or corrosion — you get several times the life of ordinary bronzes, and avoid failures, breakdowns, costly repairs and interruptions of service. Get the benefit of Ampco's extensive war experience by consulting the nearest Ampco field engineer — let us engineer your specific applications. Call or write today.

Ampco Metallurgical Specialties

Ampco Grades 12 to 22 (special alloys of the aluminum bronze class) . . . Ampcoloy (general industrial bronzes) . . . Special Custom Copper-base Alloys. Sand Castings . . . Centrifugal Castings . . . Extruded and other Wrought Products . . . Precision-machined Parts . . . Ampco-Trode (coated welding electrodes) . . . Ampco Non-Sparking Safety Tools.

AMPCO Reg. U. S. Pat. Off.

Metal

The Metal without an Equal

Valuable data free for builders and users of: Machine Tools . . . Aircraft . . . Pumps and Valves . . . Engines . . . Ordnance . . . Ships . . . Heavy Machinery . . . etc., etc.

Photographs—engineering data sheets—tables of properties — etc. Write today.

A-4

Tear out and mail coupon!

AMPCO METAL, INC.
Dept. TE-8, Milwaukee 4, Wisconsin

Please send your new catalog 23 and File 41 of Engineering Data Sheets.

Name..... Position.....

Company.....

Address.....

City..... State.....

• On this one machine you can lap and polish—quickly, precisely—a wide variety of small metal and plastics parts, each at its most efficient finishing speed! • Schauer Ideal Variable Speed Lathes provide a wide range of spindle speeds—in a ratio of 11 to 1 with a two-speed motor, or 6 to 1 with a single-speed. Write for Catalog 440, showing and describing various models and sizes.

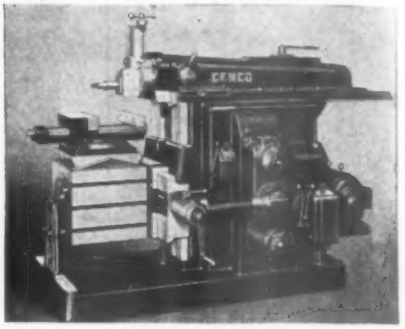
SCHAUER MACHINE COMPANY

ORIGINATORS OF TODAY'S SPEED LATHES

2068 READING ROAD --- CINCINNATI 2, OHIO

Matched for the Job!

GEMCO *Multi-Purpose* **SHAPERS**



UNIVERSAL TYPE

PLAIN TYPE A fast utility machine for a wide variety of the average shop work and for training purposes in industrial schools

PRODUCTION TYPE Massively constructed with a large table to handle medium heavy work on a peak production basis with high limits of accuracy.

UNIVERSAL TYPE Ideal for tool and die work, experimental laboratories and model shops or where angular work set-ups are required.

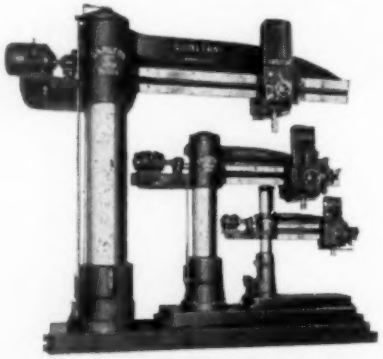
Write for illustrated bulletin GC-12T.

Immediate Deliveries on Firm Orders!

GENERAL ENGINEERING & MFG. CO.

ST. LOUIS 4, MISSOURI

Manufacturers of Precision Equipment SINCE 1917



"Anti-friction Bearings Throughout"

CARLTON RADIAL DRILL FEATURES—

1—LOW HUNG DRIVE TO THE SPINDLE

2—ALL POWER DRIVEN PARTS RUNNING IN OIL

3—QUIET RUNNING AT ALL SPEEDS

4—CONCENTRATED AND CONVENIENT CONTROLS

5—CONSTRUCTED ON UNIT PRINCIPLE

THE CARLTON

MACHINE TOOL COMPANY

CINCINNATI, OHIO, U.S.A.

WILLEY'S

DIAMOND TOOLS and TUNGSTEN CARBIDE TOOLS

Write Today for WILLEY'S TWO BIG CATALOGS

No. 41 Covers the full line of Willey's diamond tools, diamond and mechanical wheel dressers. Illustrates proper methods of caring for diamond tools.

No. 27 Describes and prices standard tungsten carbide tools and tips. Valuable charts of proper cutting speeds for various materials. Special tools and gages.

A Dependable Source of Supply

WILLEY'S CARBIDE TOOL CO.

SOLE MAKERS OF WILLEY'S METAL

1342 W. Vernor Highway Detroit 1, Michigan

MODEL "AD-1"
BARTELT
PEDESTAL
INDICATOR

MICROMETER HEAD
ALSO AVAILABLE

A VERSATILE GAGE

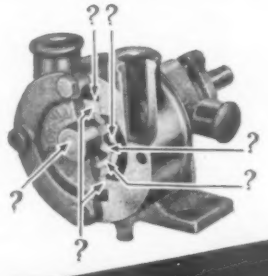
The slide may be adjusted up and down on the pedestal and the dial indicator may be swung on the rod clamped in the slide, to indicate on any vertical, horizontal, or sloping surface. The vee base also has flat feet so it may be set firmly on a plane or cylindrical surface.

BARTELT PEDESTAL INDICATOR

Horizontal or vertical indicators can be supplied, reading to .001" or .0001" on smallest division as required. Three clamps are furnished for boring-tool setting, to fit shafts from 1" to 5" diameter, also extension for the indicator rod. Bartelt gages are made of high quality material throughout, accurately machined to give long and reliable service.

Write for Circular

BARTELT ENGINEERING COMPANY
1220-H Partridge Ave., Beloit, Wis.



TUTHILL'S COOLANT PUMP OFFERS "Secret Weapons" AGAINST CHIPS AND GRIT

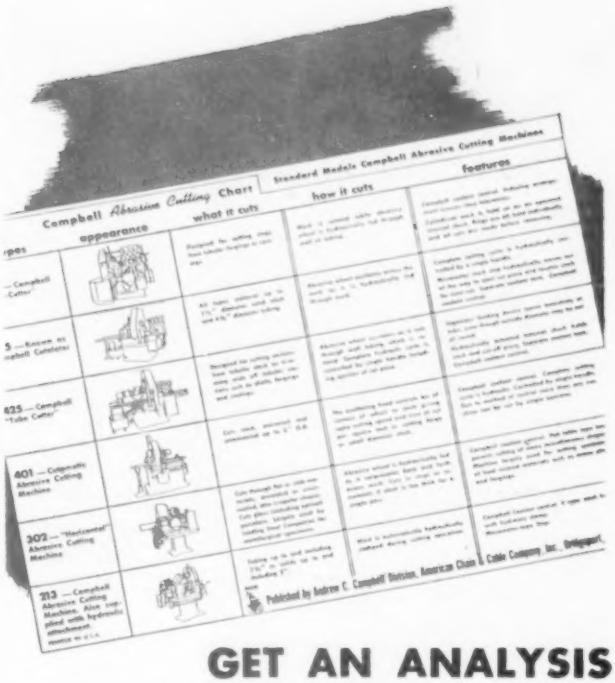
Write today for full information on the internal-gear rotary Tuthill Coolant Pump with the built-in automatic by-pass that laughs at chips and grit. Sizes from 1 to 50 g.p.m. Ask for Model M bulletin.

★

TUTHILL

SERVING ARMY
NAVY • AIR FORCE
MERCHANT MARINE

TUTHILL PUMP COMPANY
939 E. 95th ST. • CHICAGO 19, ILLINOIS


Campbell Abrasive Cutting Chart
Standard Models Campbell Abrasive Cutting Machines
appearance
what it cuts
how it cuts
features
401 — Cutomatic Abrasive Cutting Machine
302 — "Horizontal" Abrasive Cutting Machine
213 — Campbell Abrasive Cutting Machine. Also supplied with hydraulic attachment.
Published by Andrew C. Campbell Division, American Chain & Cable Company, Inc., Bridgeport

GET AN ANALYSIS OF YOUR CUTTING JOBS

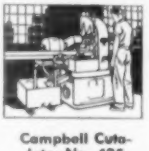
—*without obligation*

Based on the actual production records of the CAMPBELL complete range—the only complete range—of Abrasive Cutting Machines, Campbell engineers will gladly work up cost sheets and production procedures for your cutting. • All you need do is state the materials, shapes and sizes you are cutting, lengths before cutting, lengths of cut-off pieces and production required per hour. • The schedules given you will be practical and attainable. They will be based on the performance of some one of the 8 types and 19 models of CAMPBELL Abrasive Cutting Machines that are currently cutting all grades of steel, annealed and unannealed, non-ferrous alloys, plastics, glass and ceramics—solid bars, tubular and flat stock. • Ask for a copy of the chart shown above, too. It will give you fundamental information on the possibilities of abrasive cutting.

Campbell Cutomatic No. 401
Oscillating and Rotating Wheel. Cuts steel up to 6".

Campbell No. 302
Odd shapes, Flat Stock, Slotting Flat Stock, etc.

Campbell No. 213
Cuts Tubing up to and including 3½". Solids to 2".



Campbell Cutalator No. 425
Cuts Tubing up to and including 4½". Solid Bar to 3½".

Campbell

ABRASIVE CUTTING MACHINES

ANDREW C. CAMPBELL DIVISION
BRIDGEPORT • CONNECTICUT
ALSO MAKERS OF A COMPLETE LINE OF NIBBLING MACHINES

ACCO
AMERICAN CHAIN & CABLE COMPANY, Inc.
BRIDGEPORT • CONNECTICUT

NEW LITERATURE

T. M. REG. BY THE BRAMSON PUBLISHING COMPANY

OF INTEREST TO PRODUCTION EXECUTIVES

(1084) Machining

Cincinnati Milling and Grinding Machines, Inc., has just published a new publication, designated as **M-1322**, and entitled **Engineering Data.** Compiled especially for tool engineers, plant layout men, and methods engineers, the book contains engineering information, minus descriptive text and advertising. It simply supplies engineering data covering the principal products of the Cincinnati Milling Machine Co. in a single publication, and includes specifications and drawings containing principal dimensions.

(1085) Carbides

Metal Carbides Corp. has available a folder containing specifications and price lists on standard "Talide" tipped centers manufactured by the company. It includes complete standards that have been set up on carbide-tipped half centers and stub centers.

(1086) Lathe Operations

How To Increase Production On Short-Run Turning With An Automatic Lathe. Sundstrand Machine Tool Co. This 44-page booklet contains information and data on such lathe production jobs as processing gear blanks, turning and boring bushings, turning and grooving aircraft pistons, taper turning valve plugs, and similar jobs. It also contains information on processing work and how to set up the Sundstrand lathe.

INFORMATION FREE

To receive the booklets listed in this section, list the key number found on the heading of the desired literature and your name and address on the postcard coupons—page 163.

(1087) Carbides

Willey's Carbide Tool Co. has issued a new catalog, designated as **No. 27,** illustrating its standard products and showing typical applications with special designs. It includes information on the company's cutting tools, end mills, drills and reamers, milling cutters, gages, bushings, centers, dies, and carbide tool grinders.

(1088) Forgings

Chambersburg Engineering Co. has available a 20" x 30" poster for use in forge shops. The poster shows how the hot flash flows, permitting the metal to fill the die and cushioning the blow with useful work. It also shows that when the flash has cooled, the upper die hits it with the same impact as though hitting die-to-die setting up terrific stresses.

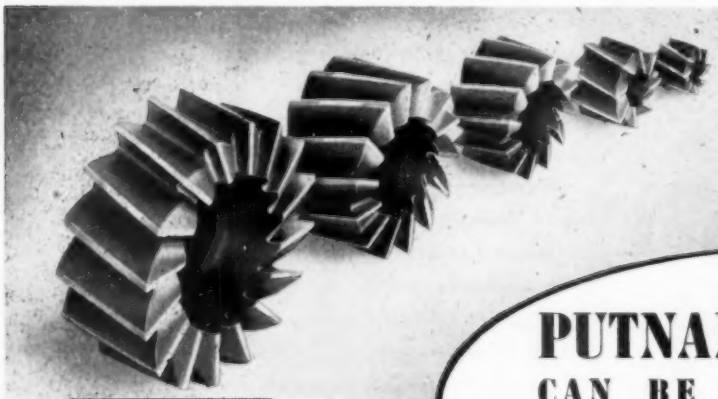
(1089) Screws

Parker-Kalon Corp. has published a **Users' Guide,** containing engineering and production data on application of self-tapping screws. It includes a selector chart which tells at a glance which of nine types of self-tapping screws to use in various materials. It also contains recommended hole sizes, stock sizes and data on use of each type of Parker-Kalon self-tapping screws for various conditions. It is offered to design engineers, chief draftsmen, and production executives.

(1090) Fasteners

The Simlok Division of The Simmons Machine Tool Corp. has published a new 16-page catalog describing improvements and uses of its "Simlok" fasteners. It describes features of the fasteners, including the basic principle that it fastens and unfastens two sheets of metal or plywood without requiring screwing and unscrewing bolts.

(Continued on page 188)



Every Size... Every Type of

PUTNAM SHELL END MILL

CAN BE SHIPPED IMMEDIATELY FROM STOCK

HIGH SPEED END MILLS • CONTINUOUS PILOT COUNTERBORES • SPIRAL FLUTED CHUCKING REAMERS

Complete assortments of Putnam High Speed Heavy Duty End Mills from 1¼" to 6" in diameter are on dealers' shelves and here at the factory. We can fill your requirements immediately from stock. In no case will it take more than 48 hours after the order reaches us for Shell End Mills to be delivered to you.

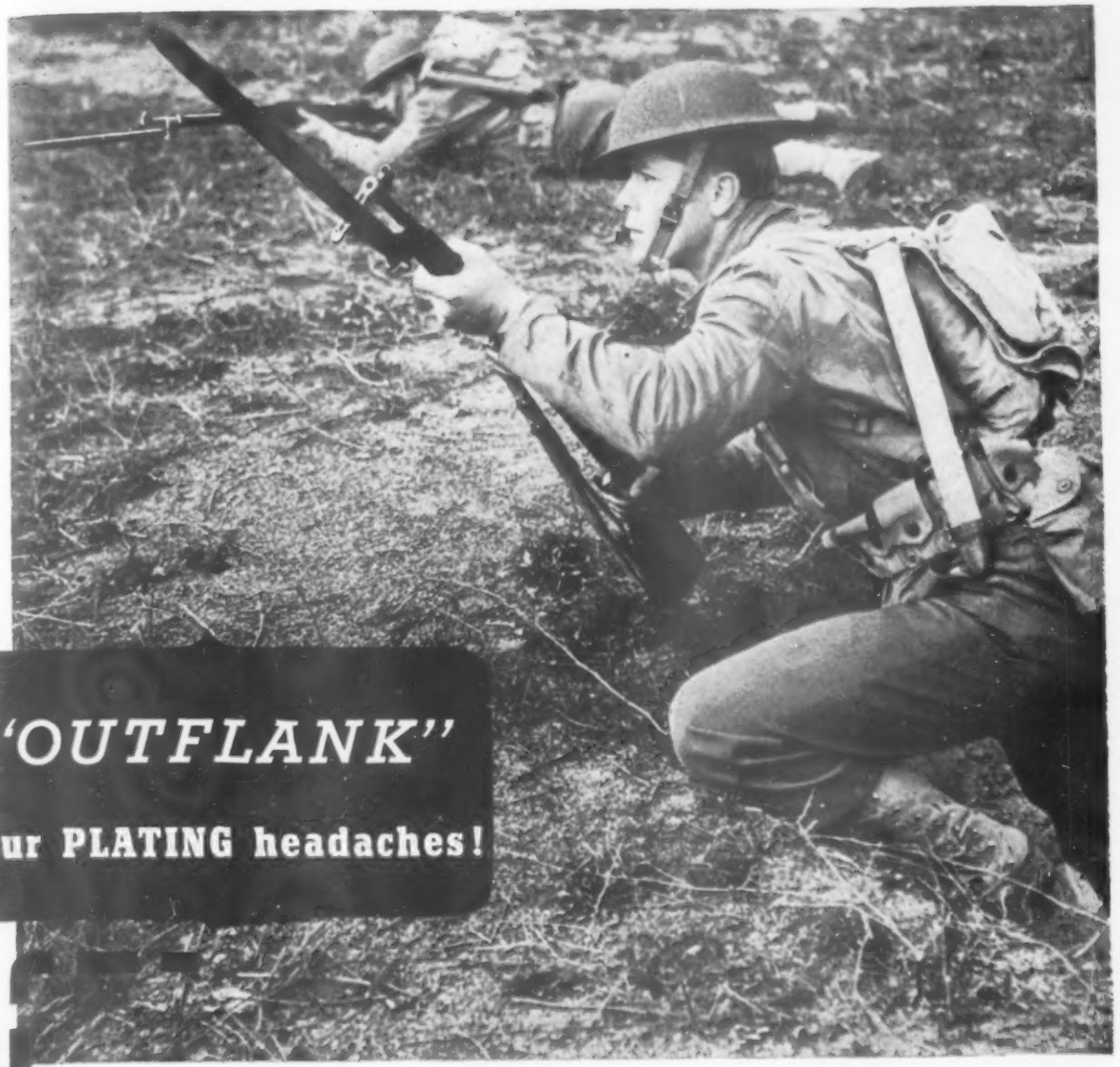
Remember that all of the 761 items in the Putnam line are carried in stock for immediate shipment.

For quality End Mills, Chucking Reamers and Counterbores that "cut faster and last longer" write, or, if necessary, wire or phone, to the nearest Putnam distributor or representative or directly to the factory. Complete information and price list will be sent on request.

ARMY E NAVY

PUTNAM TOOL COMPANY

2987 Charlevoix Avenue • Detroit 7, Michigan



"OUTFLANK" your PLATING headaches!

How is your wartime strategy these days?

Would you like to "*outflank*" some of your plating headaches—for an unconditional surrender, once and for all?

Here's how you can do it!

There's a strong supporting force, ready to help you in Hartford, Connecticut. The name of the outfit is Hartford Chrome. They have blitzkrieged chrome plating problems for hundreds of leading manufacturers in the East. They're never too late, with too little — always enough, and on time!

Throughout the war, they have added to their strength—increased their "fire-power"—and they can serve you promptly on production jobs, salvaging parts, or any hard chrome plate requirement.

How about making contact with these friendly troops? They're waiting to go over the top—*for you!*

AREA
WE SERVE

HARTFORD CHROME CORP.

525 PARK STREET • HARTFORD 6, CONNECTICUT • TEL. 2-6868

Licensed by United Chromium Inc.

(1091) Drills

Whitman & Barnes Division of United Drill and Tool Corp. has issued a new circular illustrating and describing its high-speed spotting and centering drills. It describes how short overall length permits the drills to be driven closer to the point and results in a true start or center, with the follow-up drill producing holes in perfect alignment.

(1092) Speed Lathes

Schauer Machine Co. has issued a new 32-page illustrated catalog, designated as **No. 440**, describing its wide range of speed lathes for finishing, polishing, deburring, lapping and grinding of small metal and plastic parts. It also includes a description of the company's bench and tool post grinders and pneumatic squeeze-type riveters.

(1093) Lathes

South Bend Lathe Works has issued an 8-page catalog containing information on its engine lathes, tool-room lathes, and precision turret lathes for most types of production, toolroom, and maintenance work. It contains information about capacities, speeds, feeds, and dimensions for each size and model of lathe. Also, considerable discussion is devoted to lathe attachments for special work.

(1094) Files

Hand-Cut Rotary Files. The Rotary File Company. This publication illustrates the company's hand-cut and ground-from-the-solid rotary files. It describes the standard line currently available and lists specifications.

INFORMATION FREE

To receive the booklets listed in this section, list the key number found on the heading of the desired literature and your name and address on the postcard coupons—page 163.

(1095) Machine Accessories

The Ready Tool Co. has issued a new catalog, designated as **No. 44**, illustrating and describing its line of tool holders; high speed steel, ball bearing, and carbide centers; milling machine and grinder dogs, and boring bars for use on engine lathes. Specifications and price lists are included.

(1096) Gages

Pratt & Whitney Division of Niles-Bement-Pond Co. has available a new booklet dealing with its pipe thread gages. It illustrates and describes the various types available and gives complete instructions for their use.

(1097) Air Tools

Aro Equipment Corp. announce publication of a new 32-page catalog describing its line of rotary pneumatic tools. It includes illustrations and specifications covering tools available for small jobs, such as drilling, grinding, nut-setting, screw-driving, burring, metal-sanding and similar operations. It also includes information on speed couplers, accessories, and the new line of Aro impact wrenches.

(1098) Milling

Hartford Special Machinery Co. has issued two publications dealing with its V-Block milling fixture and its four-point milling vise. Both of these milling accessories are fully described and illustrated.

(1099) Gages

Bartelt Engineering Co. has available a folder dealing with its pedestal micrometers and pedestal indicators. It fully describes and illustrates its model "A" and model "B" types and includes specifications and particular adaptations of each.

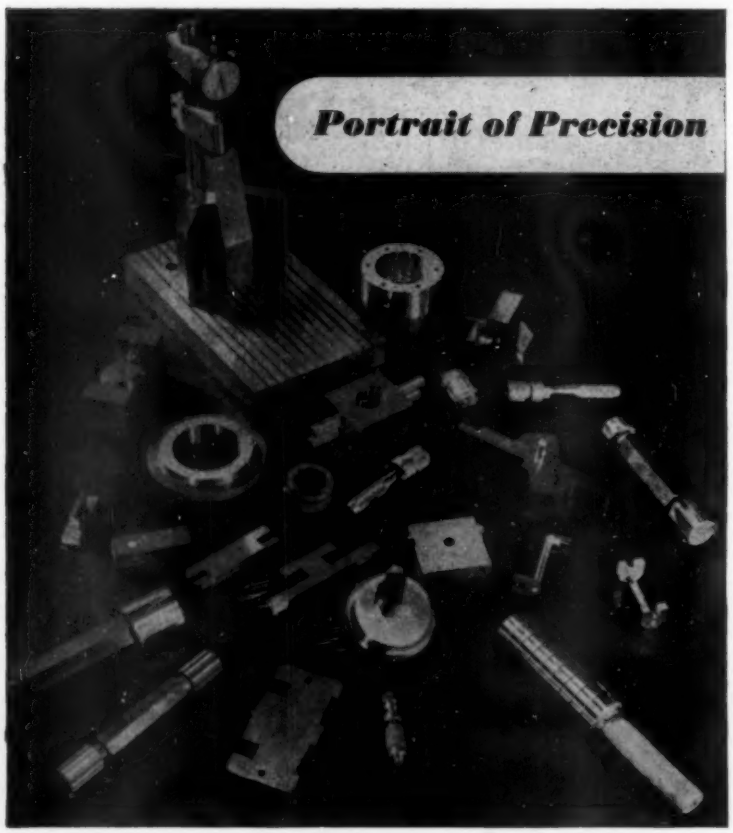
(1100) Milling Vise

Bellows CVH-60 Automatic Milling Machine Vise. This folder issued by The Bellows Company lists principal advantages and applications of its new air-vise in milling operations. Also included is a complete list of specifications.

(1101) Wear

The Nitralloy Corp. has just released a 46-page booklet entitled **Wear, A Discussion of The Mechanism of Wear Phenomena and Influencing Factors.** Written by D. Landau, industrial applications engineer for the Corporation, the book contains a variety of interesting facts concerning wear. Chap-

(Concluded on page 190)



Thousands of Haines Special Gages are accelerating output in ordnance and aircraft plants throughout the country. • Representative Haines gages as well as the men and machines which produce them, are shown in a bulletin just off press. A copy will be sent on request. HAINES GAUGE COMPANY, 2301 W. Allegheny Ave., Philadelphia 32, Pa.

Haines

ARMY E NAVY

PRECISION GAGES

PLUG • RING • SNAP • FLUSH PIN • PROFILE • ETC.

SPEED UP PRODUCTION

WITH SOUTH BEND LATHES

Time saved on production speeds the delivery of vital matériel to our fighting forces. Now, on the home front, it is a fight to the finish for maximum production.

South Bend Lathes can help you speed up production on toolroom and manufacturing operations. They have dependable precision, a wide range of speeds and feeds, and the strength and rigidity for effective use of tungsten carbide tools. Their ease of operation also contributes to their efficiency.

South Bend Engine Lathes and Toolroom Lathes are made in five sizes ranging from 9″ to 16″ swings, with bed lengths from 3′ to 12′. The Turret Lathes have 9″ and 10″ swings. Catalog 100C will be mailed upon request.

★ BUY U. S. WAR BONDS ★

16″ swing, South Bend Toolroom Lathe

ARMY-NAVY "E"

SOUTH BEND LATHE WORKS • Lathe Builders for 37 Years • South Bend, Indiana

ter headings include: **The Mechanism of Wear; Wear and Physical Properties; Molecular Adhesion; Surface Melting; Specific Pressures; Lubricants and Wear; Galling; Scoring; Fretting; Gear Pitting; Work Hardening; Chemical Effects; Wear In; Wear Out; Wear of Nitralloy vs Other Steels; and Surface Finish and Wear.**

(1102) Mechanical Screwdrivers

Detroit Power Screwdriver Co. has issued a catalog entitled **Magazine Feed Power Screwdrivers and Motorized Hopper Units.** It lists the various models together with complete illustrated descriptions and specifications. It also includes a discussion of fixtures to be used with the machine.

(1103) Welding

Complete specifications of the P & H model WP-2 welding positioners are included in a new bulletin issued by Harnischfeger Corporation. In addition to listing features of the positioner, the bulletin also discusses special mountings and fixtures to meet all welding requirements.

(1104) Engraving

H. P. Preis Engraving Machine Co. has available a new publication dealing with its Panto utility engraver. It deals chiefly with the model UE-3 heavy duty bench type machine for engraving, electrical marking, and acid etching. It lists capacity, standard equipment furnished, dimensions and weight, and additional equipment and attachments. Also included is information on electrical marking equipment, acid etching equipment, work holding devices, and the company's grinder for single-lip engraving and routing cutters.

INFORMATION FREE

To receive the booklets listed in this section, list the key number found on the heading of the desired literature and your name and address on the postcard coupons—page 163.

(1105) Motor Controls

Weltronic Company has issued a four-page two-color technical bulletin, designated as **No. WTM-44,** describing the company's new electronic, adjustable-speed motor drives for operating any D-C shunt-wound ½ hp to 15 hp motors from A-C power supply for driving industrial machines. This bulletin completely describes and illustrates the new control, together with specifications and applications.

(1106) Surface Plates

Geo. Scherr Company, Inc., has available a four-page folder introducing the company's new glass surface plate. This bulletin also contains information on the company's toolmakers' knee, inspection set, and gage block utility set.

NEW BOOKS

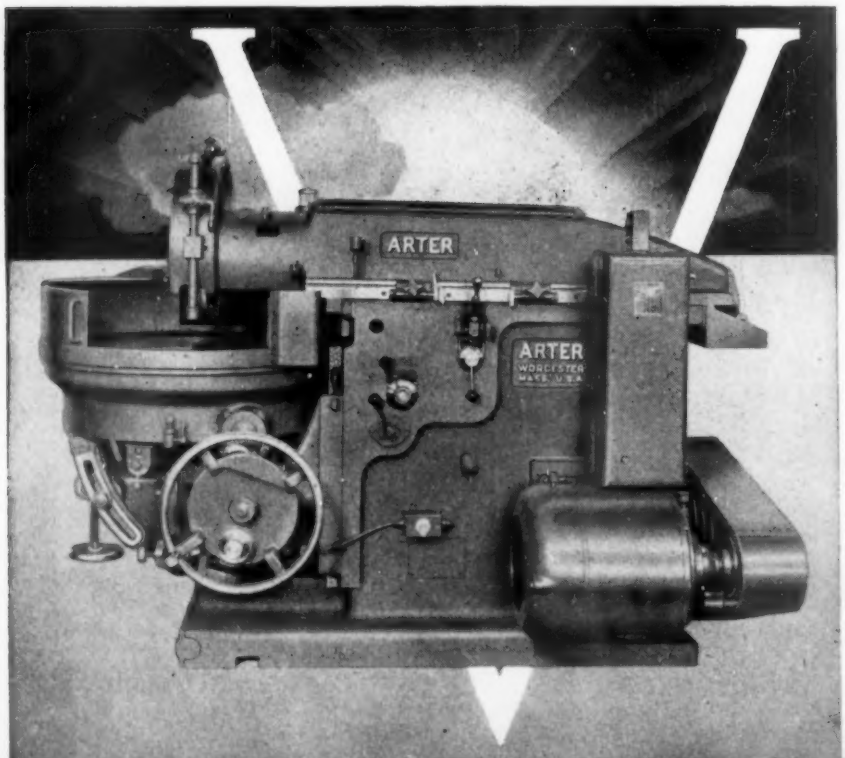
Practical Design for Arc Welding. The Hobart Brothers Company. Price $3.50 per volume, complete 3-volume set $10.00.

Containing 100 design plates, Volume 1 of a projected 3-volume set has been published in response to many requests following original publication and distribution of a number of design plates in loose leaf form. The book is not a text but rather is an illustrated compilation of information and detailed drawings showing how tubing, plate, sheet, standard steel sections, angles, and bars can be used to fabricate products with arc welding at lower costs.

Engineering Inspection Practice. 238 pages. Chemical Publishing Company, Inc. Price $3.00.

Written particularly for the sub-contractor and the small manufacturer who employs methods previously limited to large manufacturers and also of importance to individuals who are training for specific inspection jobs, this book serves as a guide to the methods, gages, and instruments used in engineering work shops.

This covers such phases of inspection as reading the working drawings, limited tolerances, linear and angular measurements, hand-measuring tools, the micrometer, and measuring instruments. Contains many helpful tables.



Versatility is a well recognized quality in Arter Rotary Surface Grinders and versatility is highly important in production changes that these changing times are sure to bring.

Progressively developed, precisely engineered, Arters are worthy of the highest type of American production methods which are today, winning the war. For today's demands and for tomorrow's new problems — Arters.

ARTER GRINDING MACHINE COMPANY

ARMY E NAVY

WORCESTER, MASSACHUSETTS • U. S. A.

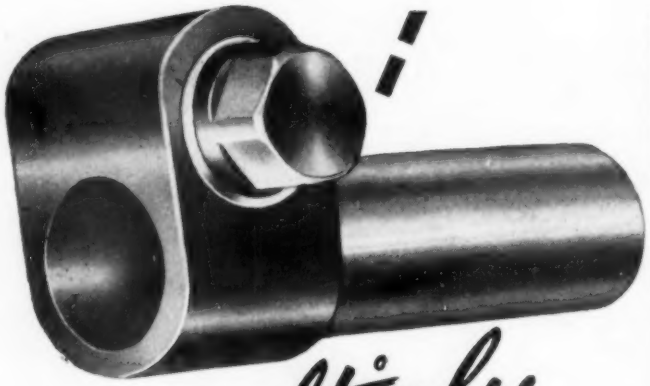
Deliveries NOW Within 30 Days

HERE'S a typical, everyday use for Johansson Gage Blocks —a time-saver that makes real inspection accuracy a simple, rapid-fire operation. Using a stack of Jo-Blocks and an ordinary surface gage, set your dial indicator at zero on the blocks—if the work measures zero too, it's *right*. Hundreds of other uses, such as in tool set-up, in laying-out, in scribing, in checking mikes and working gages. Popular Set No. 1, of 81 blocks, makes 120,000 different size gages, in steps of .0001 from .200 of an inch to more than 12 inches. Jo-Blocks are much lower in price than most folks think. Two grades—accurate to .000004 and to .000008. Write for catalog 16. Address: FORD MOTOR COMPANY, Johansson Division, Dept. TE, Dearborn, Michigan.

Ford

Johansson

GAGE BLOCKS



Multiply

THE CAPACITY OF

SCREW MACHINES WITH

BOYAR-SCHULTZ

MODEL H
PRECISION

ADAPTER

A PRECISION TOOL in every way, built to become a permanent part of screw machine equipment. It increases the flexibility of screw machines, making it possible to use more than one size tool on a single size machine.

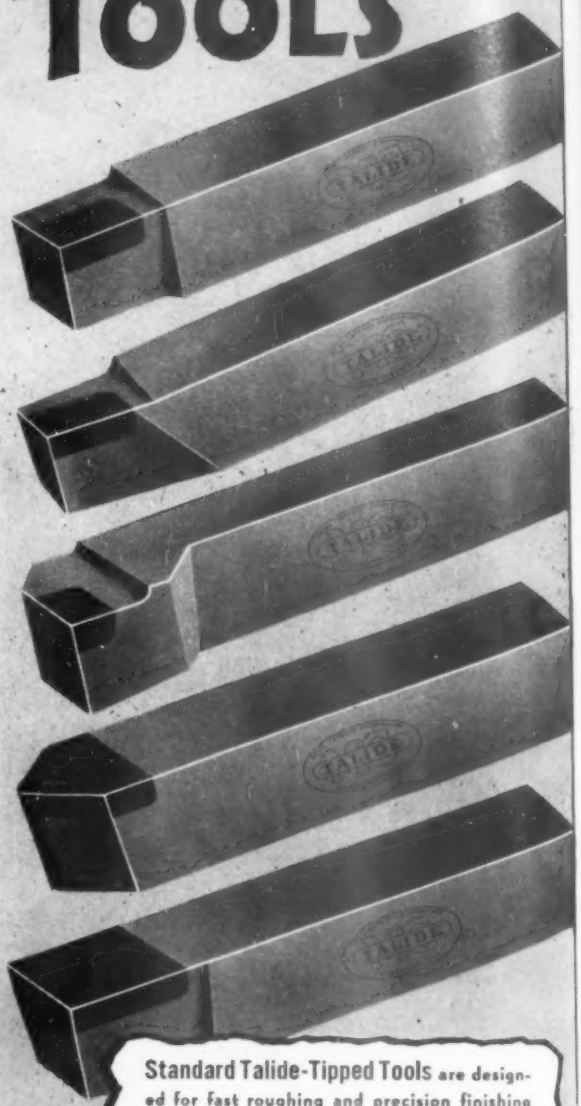
With this Adapter, a Size 2 screw machine can accommodate Size 00 and Size 0 Tools. Size 00 Tools are readily used in Size 0 machines.

Made from the best obtainable alloy steel, it is hardened and ground to close tolerances to assure correct fit and will stand up under long, continuous service.

WRITE FOR
NEW CIRCULAR

BOYAR-SCHULTZ CORPORATION
2116 WALNUT ST. CHICAGO 12, ILLINOIS

TALIDE-TIPPED TOOLS

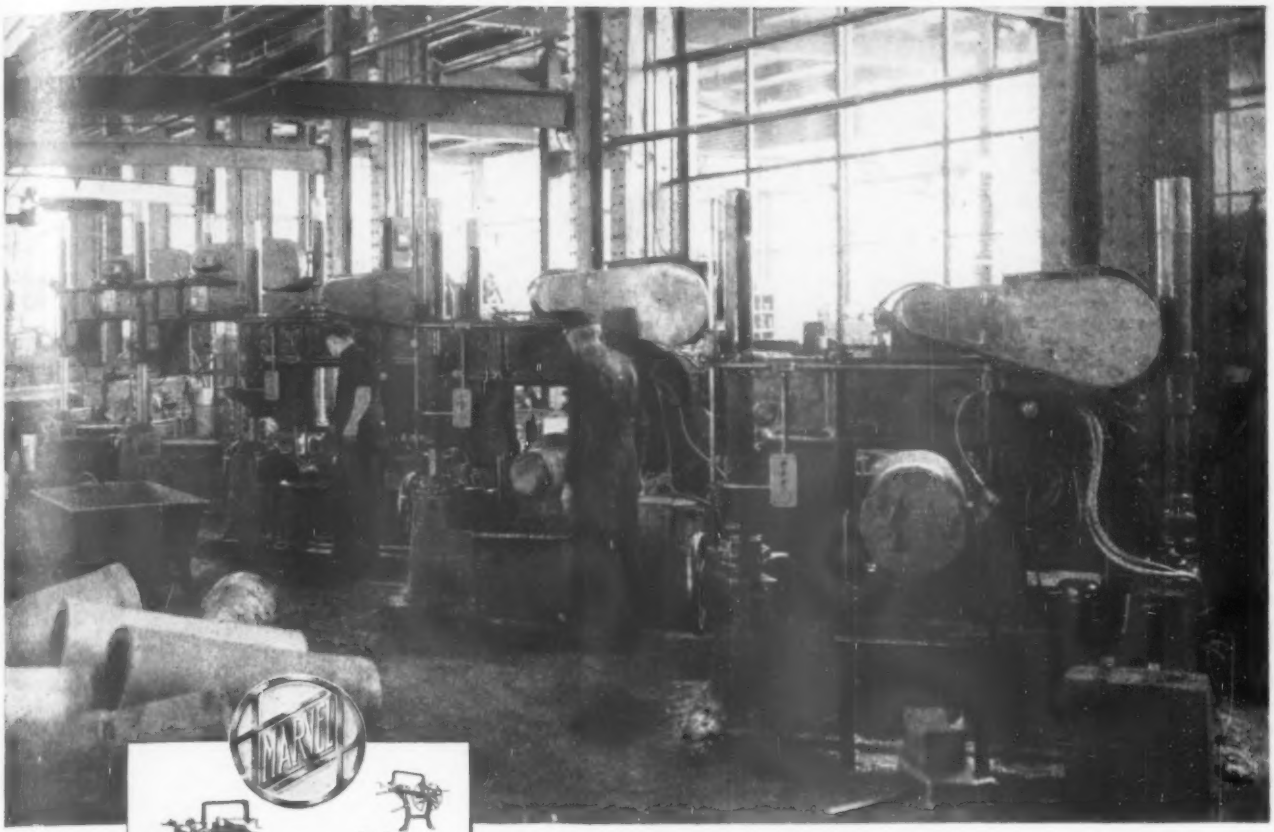


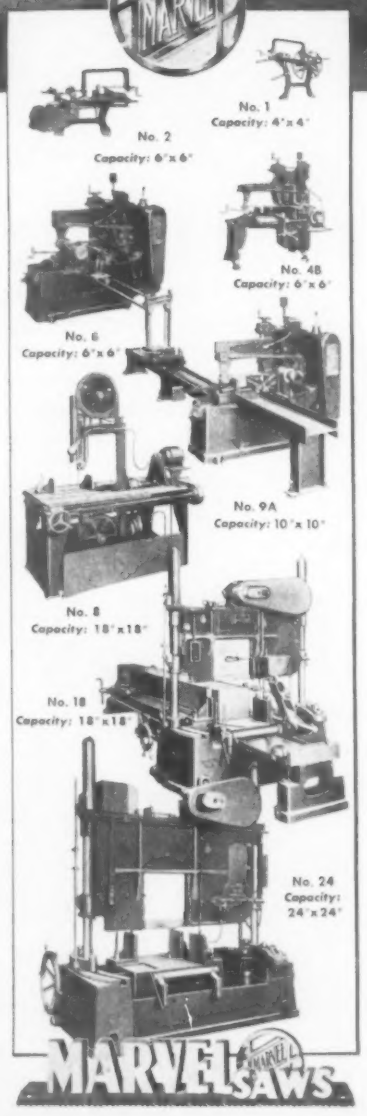
Standard Talide-Tipped Tools are designed for fast roughing and precision finishing operations on all types of steels, cast iron and non-ferrous metals. Available in both Tungsten Carbide and Tungsten-Titanium Carbide compositions, Talide Tools give longer run, higher speed performances on all kinds of machining operations including turning, boring and facing. Send for catalog No. 43-T.

TIPPED WITH TALIDE TUNGSTEN CARBIDE

METAL CARBIDES CORPORATION YOUNGSTOWN, OHIO

METAL CARBIDES CORPORATION
YOUNGSTOWN, 5 OHIO
TUNGSTEN CARBIDE TOOLS . DIES . WEAR PARTS





Hack Saw Method Steps up Locomotive Production

In the large shops of the American Locomotive Co., at Schenectady, wartime production has reached a new peak.

Among the improved methods contributing to this record output, has been the increase in the use of the modern MARVEL Hack Saws for cutting-off even the largest work; for cutting-off car axles, wrist pins and all large forgings—work formerly done with more expensive methods and costlier equipment. One of the first to discover the efficiency and economy of the hack saw method for large work, this company ordered three No. 18 MARVEL Giant Hydraulic Hack Saws soon after these revolutionary Saws were first announced. Today, they are using twenty MARVEL Sawing machines, including eleven of these massive, ruggedly built giant hydraulics.

MARVEL Saws are increasing the production of war materials in all parts of the country by rapidly, accurately and economically cutting-off the toughest steels in cross sections up to 24" x 24". If you have metal sawing problems, call on the local MARVEL Engineer to recommend methods and equipment.

BUY FROM YOUR LOCAL DISTRIBUTOR

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 W. Bloomingdale Ave., Chicago 39, U. S. A.

Eastern Sales Office: 225 Lafayette St., New York 12, N. Y.

MARVEL SAWS

HANDY ANDY *Says*—

T.M. REG. BY THE BRAMSON PUBLISHING COMPANY

RESUMING the theme of July, re- college degrees for tool engineers, I want it known that I am strongly for college training, just as I favor registration of engineers in executive or supervisory positions. Naturally, that holds for all who aspire to advancement in engineering fields.

What I am opposed to is premature legislation that would immediately limit the use of the term "engineer" to college graduates or the duly registered. In my opinion, the immediate result of precipitate action would be to lower profession standards rather than to enhance them.

▲ ▲ ▲

Therefore, if such restrictive laws are to be enacted, they should not become effective until some future date, say 5 to 10 years from date of passage. Such was the setup in Michigan, which should establish a national precedent.

That way, experienced men in the middle age brackets who, latterly, have rendered invaluable service in tooling the nation for war, could carry on until retired. Or, if they so chose, they could prepare for and take the exams necessary for registration. Deferment would also encourage technical training and the broadening of curriculae in our various engineering schools.

As it is, late developments—such as tool engineering and welding— have been but superficially touched upon by our educators; here, the pioneers have been the practically trained.

▲ ▲ ▲

For that very reason, legislation directed against the practically trained but otherwise qualified would not only be discriminatory but reactionary. And we want engineering progress. Yet, we must view restrictive legislation without prejudice. While it is my belief that the legislation is largely inspired by the "book engineers", the intent behind the act is to protect.

No term has been so badly abused, during the past few years, as that of "engineer". Tinware peddlers and back alley plumbers have alike become pretenders to the title, and many an engineering form, so called, has mushroomed on no other premise than a desire for profits. And the keystone of engineering is **Service!**

Personally, I have no sympathy for the shysters. And fortunately, these eventually tangle themselves up, regardless of the length of rope, but, by the same token, I'll defend the experienced and conscientious who gives value for his fees, be he graduate of a college or the school of hard knocks. It's the quality, and the scope of service that count, not the degree.

▲ ▲ ▲

Yet, it is quite apparent that, under present industrial conditions, the school of experience offers fewer opportunities than the college, and we must look ahead. So, let's fight discrimination and premature restrictions while we encourage technical training.

For some reason—fear, no doubt—orthodoxy has always resisted the new. And the new, regardless of how radical it may seem in the beginning, in turn becomes conservative. It is so with nations that revolt as it is with minorities at variance with tradition.

Take the osteopaths, for example, anathema to the American Medical Ass'n. Now, I've had considerable experience with medics in my time, and I've run across some M. D.'s that I wouldn't call a second time to dose an alley cat. They had the degrees, but that was all.

▲ ▲ ▲

But I also owe my life, several times over, to leaders in the medical profession. And here, a brief for the specialist; they know their line and they're usually too busy to string you along.

Lately, my doctor of several years

(Concluded on page 196)

A "SYSTEM"-NOT A FEW INDIVIDUAL TOOLS!

"O K" stands for a metal-cutting **system** — a variety of inserted-blade metal-cutting tools wide enough to meet the major needs of any metal-cutting industry. Milling, reaming, boring, turning, planing can all be speeded up and usually improved by the consistent use of these modern tools.

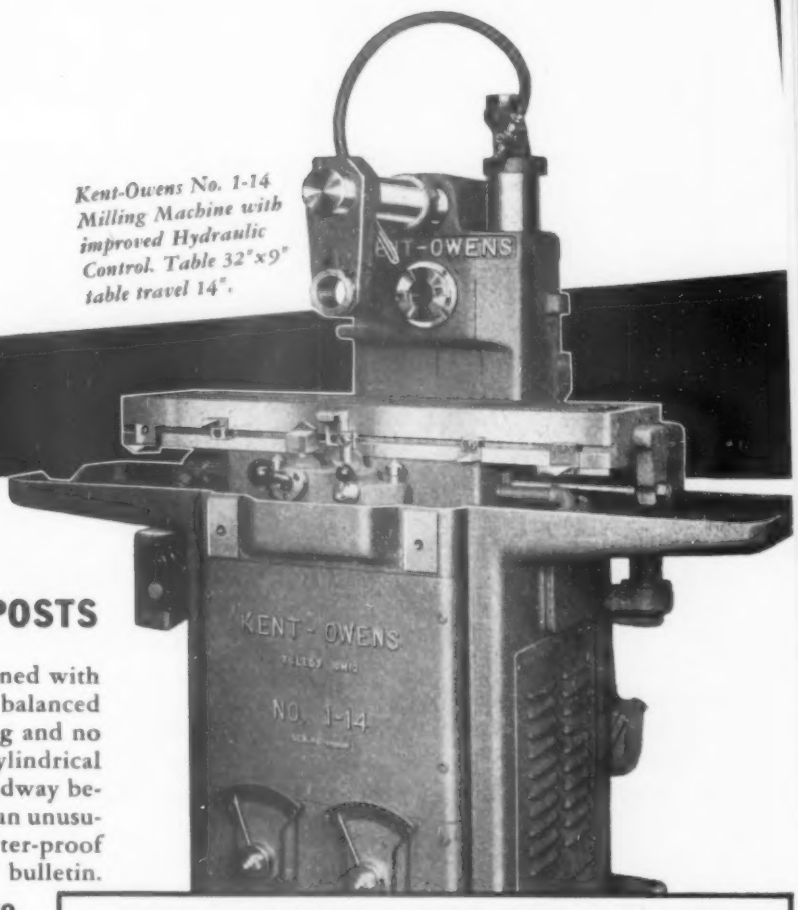
At present, O K Tools are sold only under war regulations, but peace is now definitely in sight, so here's a peacetime suggestion: (1) outfit an entire department with the O K System; or (2) **sample** its efficiency by "peaking up" some one run of work with certain specially selected O K Tools. Actual experience will then demonstrate why they are so highly regarded in metal working shops.

MODERN TOOLS FOR MODERN METAL CUTTING

THE TRADE OK MARK SYSTEM
OF INSERTED-BLADE METAL CUTTING TOOLS

THE O K TOOL CO., SHELTON, CONN.

Balanced load!

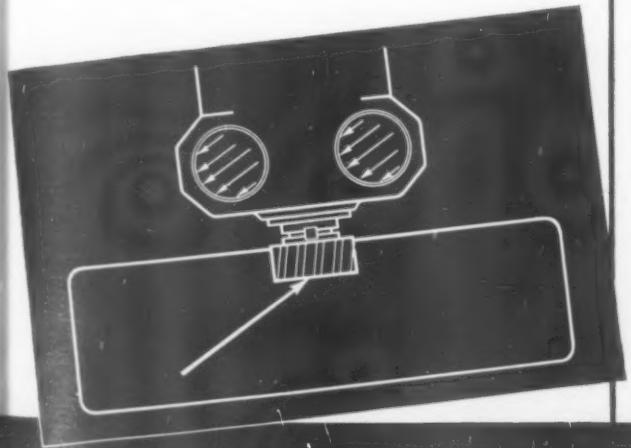


Kent-Owens No. 1-14 Milling Machine with improved Hydraulic Control. Table 32"×9" table travel 14".

Exclusive
MOUNTING BETWEEN TWO POSTS

Only Kent-Owens Milling Machines are designed with the head mounted on twin posts — assuring balanced load in either direction. There is no overhang and no cocking action. The head is mounted on two cylindrical ground steel posts which carry the spindle midway between them. Shop men like its performance — an unusually rigid and accurate machine, practically chatter-proof for either direction of table travel. Send for bulletin.

KENT-OWENS MACHINE COMPANY . . . TOLEDO, OHIO



THERE'S A KENT-OWENS REPRESENTATIVE NEAR YOU

BOSTON
General Machinery Corp.

BUFFALO
Don W. Patterson

CHICAGO
Neff, Kohlbusch & Bissell

DALLAS
Hamilton-Huster Machinery Co.

DAYTON
Gosiger Machinery Co.

DETROIT
A. C. Haberkorn Machinery Co.

GRAND RAPIDS
Joseph Monahan

HOUSTON
Oliver H. Van Horn Co., Inc.

INDIANAPOLIS
Oatis-Booth Machinery Co.

KANSAS CITY
Eichman Machinery Co.

LOS ANGELES
Eccles & Davies Machinery Company
Harron, Rickard & McCone

MILWAUKEE
Neff, Kohlbusch & Bissell

MINNEAPOLIS
The Satterlee Company

MOLINE
John J. Normoyle Co.

MONTREAL
F. F. Barber Machinery Co.

NEW ORLEANS
Oliver H. Van Horn Co., Inc.

NEW YORK
Wilson Brown Company

PHILADELPHIA
Calco Machinery Company

PITTSBURGH
Barney Machinery Co.

ROCHESTER
F. W. Schiefer Machinery Company

SAN FRANCISCO
C. F. Bulotti Machinery Co.

SEATTLE
Star Machinery Company

ST. LOUIS
Blackman & Nuetzel Machinery Company
Clarke Equipment Co.

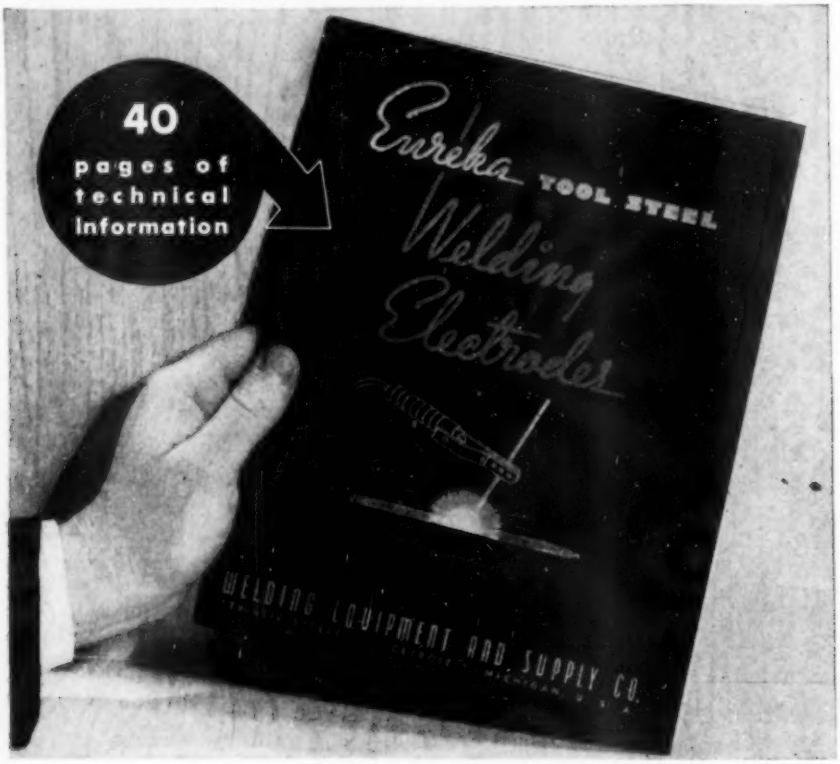
SYRACUSE
J. F. Owens Machinery Co.

TORONTO
F. F. Barber Machinery Co.

WALKERVILLE
F. F. Barber Machinery Co.

Call on KENT-OWENS *for Milling Machines*

YOU SHOULD HAVE THIS . . .



SOURCE OF VITAL INFORMATION

It tells all about TOOL STEEL welding

★ **This manual will help you save man-hours, conserve material and minimize production delays by outlining methods of repairing and compositely fabricating tools and dies, as well as correcting design and rectifying errors. Send for your copy of this manual today. It is fully illustrated with typical welding applications.**

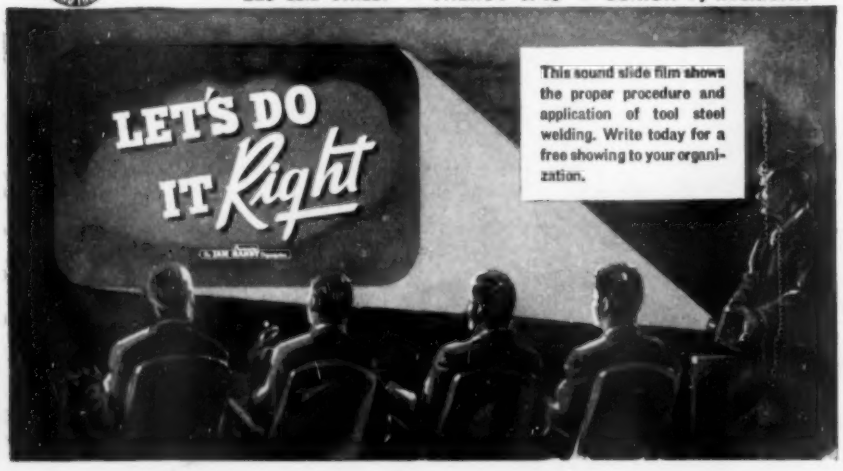
DISTRIBUTORS IN PRINCIPAL CITIES OF THE UNITED STATES AND CANADA

EUREKA ELECTRODES FOR EVERY WELDING NEED

Welding Equipment & Supply Co.

WELDING ENGINEERS WITH A COMPLETE SERVICE

223 LEIB STREET • FITZROY 3715 • DETROIT 7, MICHIGAN


LET'S DO
IT Right
This sound slide film shows the proper procedure and application of tool steel welding. Write today for a free showing to your organization.

—HANDY ANDY SAYS—

(Concluded from page 194)

standing having joined the Army, I've had osteopaths for myself and family, and with excellent results. The only difference, as far as I can see, is that the osteopath is debarred from the appending M. D. to his name. You see, he's outside the pale of the A. M. A. So, by the way, is Sister Kenney, miracle worker among infantile paralytics, who cures where the medics fail. You see, she has a new way.

We can draw, here, a certain parallel in the A. S. T. E. At the outset, we were outside the pale of the recognized engineering professions. For that matter, we are still struggling for recognition—or, should I say, for appreciation of services rendered?

▲ ▲ ▲

For certainly, the tool engineers have done an Herculean job in tooling America and her Allies for war. The truly remarkable thing is that so few could have done so much and with so little fanfare.

Well, we were the radicals in a world of smug engineering conservatism. We were the "nut crackers"—and the nuts we cracked! Unsteeped in engineering ethics, many of us may have been, and mayhap considered "roughnecks" by the orthodox, yet, when it came to the impossible we somehow crossed off the negative prefix and proved that the job could be done if the end justified the means. Judging from results, it must have.

No, I'm not crowing, and I use the "we" simply because I'm one of the boys. Personally, I've never done anything remarkable, nor, as far as that goes, have I heard any of our members unduly toot his horn.

But facts are facts, and we'll just have to let the world know we're here, and here to stay and grow. And, in time, we'll probably join the ranks of the conservatives, although I hope that we'll never be content to rest on our laurels. May there always be a goal ahead!

▲ ▲ ▲

In this connection, I see a great future for the tool engineers—all engineers, for that matter. Yet ours is a unique place in the engineering world in that we take the creations of the inventor and the product engineer and multiply them infinitely into consumer goods. That, in turn, requires a high quality of inventive genius. But more than that, it demands knowledge of tools.

Tools took the automobile, at first a toy for the rich, and put it into ranking place as transportation for the masses. And the tools of mass production are the result of "know-how", that combination of practical and theoretical training of which the conservative engineering world is just becoming cognizant. And "know-how" is something that can't be legislated into the individual, any more than one can successfully legislate morals or ethics.

All one can do is to set up a code, and here, the code of the tool engineers will compare favorably with any in the field of engineering. That, too, is fact. THE END

AUTOMATIC LATHES

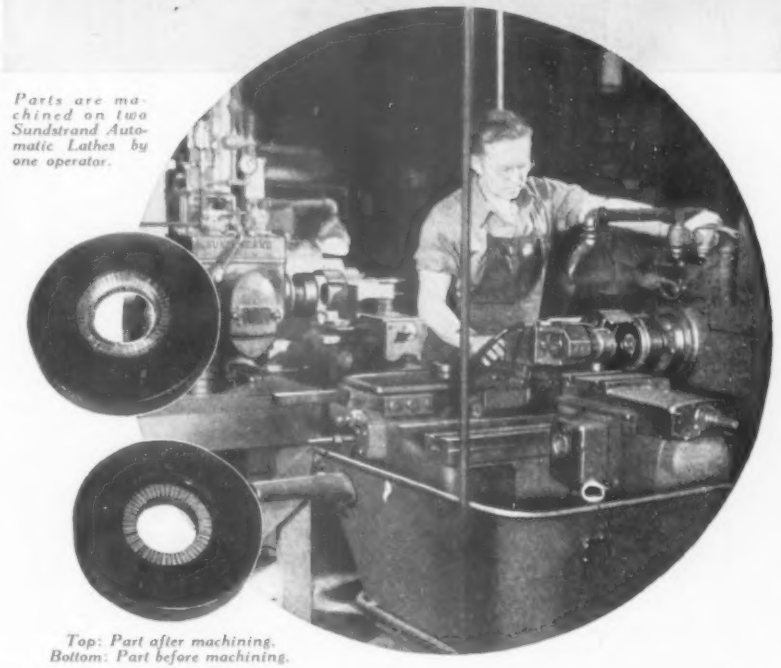
cut turning time *from 6 minutes to 29 seconds...* on copper commutator assembly

One Operator and 2 Sundstrand Machines Turn Out 12 Times Old Production Rate

Increased production of this part was required to eliminate a bottleneck in the manufacture of "dynamotors" by a well-known electrical firm. With the installation of Sundstrand Automatic Lathes, machining time has been cut from 6 minutes to 29 seconds on the operation illustrated.

The rough part consists of a commutator assembly composed of copper laminations separated by mica segments. As shown, it is required to bore a portion of the I.D., undercut the adjoining portion, break and form the corner and face the outer surface. The job was formerly handled on a high-speed engine lathe. Machining time ran 6 minutes per piece. Because of the manually controlled cycle, an operator was required for each machine. Multiple tooling and automatic cycling on two Sundstrand Model 8 Automatic Lathes now complete this job in a matter of 29 seconds per piece. One operator handles two machines, thus effecting a substantial savings in manpower.

Three high-speed tools, mounted in a special holder, are used on this job. Carbide tipped cutting tools are also commonly used on Sundstrand Automatic Lathes.



Parts are machined on two Sundstrand Automatic Lathes by one operator.

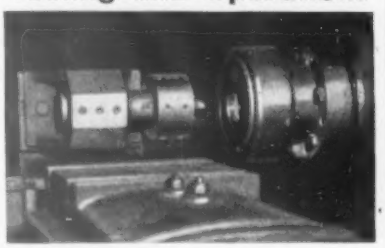
Top: Part after machining.
Bottom: Part before machining.

Here's What Sundstrand Automatic Lathes Can Do for You on Both Long and *short-run work*

A machinist of average skill requires only 30 minutes to set up the automatic cycle and tooling of a Sundstrand Lathe for an average job using 5 tools. No cams are employed—three standard trip dogs adjusted on the cycle control disc handle most work. Because of this simple set-up method, Sundstrand Automatic Lathes, properly tooled, will make possible important time savings on both long and *short-run work*.

Learn what a Sundstrand can do for you—get your copy of this *free* practical book that gives details of actual applications on all kinds of work. Write for Book 827.

Tooling and Operations



Commutator assembly is held in collet type chuck, pneumatically operated. Part is located by stop against copper. Three high-speed steel cutting tools are mounted in special holder.

Material—Copper laminations separated by mica segments.

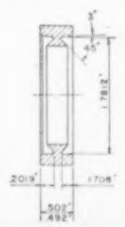
Operations—Bore portion of I. D., undercut adjoining portion, break and form corner, and face outer surface at one pass.

Feed—0.004 in.

Working Stroke—¼ in.

Cutting Tools—High-speed steel.

Drawing below shows operations performed at one pass on one side of commutator assembly. Part is then turned over for same operations on other side.



SUNDSTRAND MACHINE TOOL CO. ROCKFORD, ILLINOIS U.S.A.

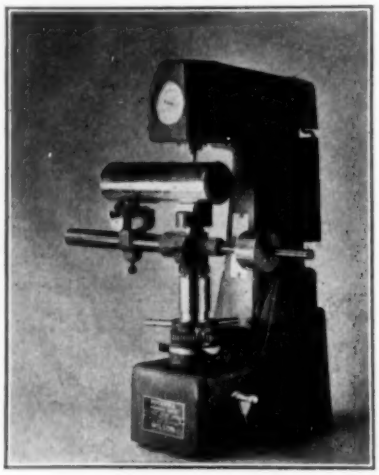
ARMY NAVY

SUNDSTRAND MACHINE TOOL CO.

Rigidmils • Fluid-Screw Rigidmils • Automatic Lathes • Hydraulic Equipment • Drilling and Centering Machines • Special Milling and Turning Machines

2532 ELEVENTH ST., ROCKFORD, ILLINOIS, U. S. A.

"ROCKWELL" HARDNESS TESTER



Shipment within a few days of these enormously improved new models

383 CONCORD AVE.
NEW YORK 54, N. Y.

WILSON
MECHANICAL INSTRUMENT CO., INC.
"An Associate Company of American Chain & Cable Company, Inc."

ACCURATE SPACING ASSURED
with the
RED-E MILLING MACHINE DOG

The easiest way to avoid "THAT ONE THICK TOOTH" in gear cutting.

Write for Catalog E-42

THE READY TOOL COMPANY
585 IRANISTAN AVE.
BRIDGEPORT CONN.

Simplified Grinding
with PARKER-MAJESTIC
Internal and External Grinders

For precision grinding . . . internal or external . . . Majestic simplicity of design and flexibility of changeover guarantee maximum grinding output at low cost.

Send for descriptive circular . . . NOW!
Representatives in all principal cities.

PM **Majestic Tool & Mfg. Co.**
2950 E. WOODBRIDGE • DETROIT 7, MICH.

Columbia TOOL STEEL

HIGH SPEED STEEL—
In this day of work pressure do not overlook the universal utility of high speed steel.
No other cutting material has its strength and toughness.
It pays to use Good Tool Steel.

COLUMBIA TOOL STEEL COMPANY
ARTHUR T. CLARAGE, PRESIDENT
MAIN OFFICE AND WORKS
520 EAST 14TH. STREET • CHICAGO HEIGHTS, ILL.

THESE ADVANTAGES SIMPLIFY MAGNETIC CHUCKING

NO WIRES — NO AUXILIARY CURRENT — BUT A COMPLETELY SELF-CONTAINED CHUCK

Ask your dealer to explain these advantages—or send for circular—Brown & Sharpe Mfg. Co., Providence, R. I.

For Sale only in the United States of America and its territories and in Canada

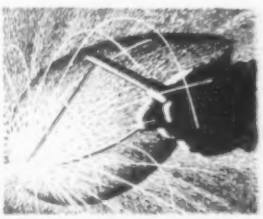
BROWN & SHARPE
MAGNETIC CHUCKS
PERMANENT MAGNET TYPE

Revolutionary Hy-cycle Automatic Arc Provides Complete Control of Arc and Heat

At last, a development that automatically starts the arc before the welding electrode actually comes in contact with the work! Eliminating the "pecking" or "scratching" that so often creates tension and operator fatigue. Its many advantages contribute largely to saving time and labor because an operator can be trained in far less time than usual, and higher speeds can be obtained. This hy-cycle automatic arc unit, called "Missing Link," permits the operator to weld with any welding rod, bare steel or alloy. Rods that could not be used before can be burned with ease—such as bare mild steel, dust coated, reverse polarity, aluminum, bronze, stainless steel, etc., AC or DC.

Simplifies welding vertica and overhead

One of its most important advantages is welding light gauge. Light gauge requires low heat—making many jobs almost impossible for ordinary methods. Since the "Missing Link" starts automatically on as low as one ampere of heat, the welding of light gauge sheet can be done with surprising speed with no time out for "pecking" and "sticking."



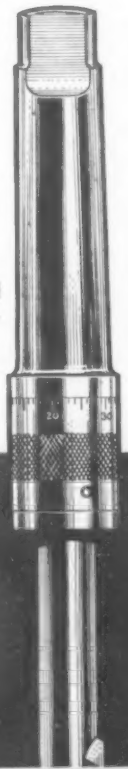
Makes it easy to weld light gauge work

You all know that our fighting men need the finest quality materials that we here at home can produce. That goes for Wrigley's Spearmint Gum, too. Although our stock pile of quality raw materials is getting lower and lower we are maintaining our standards of quality. Naturally, we are forced to limit production. So we are giving priority where it is needed most—and where you want us to—our fighting men and women overseas only. Because chewing gum is essential to them—they are getting all of our limited production of Wrigley's Spearmint Gum.

You can get complete information from Mid-States Equipment Company, 2429 South Michigan Avenue, Chicago 16, Illinois.

Y-134

UNIVERSAL MIKRO-LOK BORING BARS



Universal Mikro-lok Boring Bars are designed for finishing cuts where extreme accuracy is required. For jig boring, diamond boring and screw machines. Especially adapted for boring to a shoulder, or to the bottom of a hole or where intermittent cuts are being taken. Extremely rigid. Easily and quickly adjusted like a micrometer to limits of .0005 or less. Available singly or in sets. Write for facts and prices.

UNIVERSAL ENGINEERING CO.
FRANKENMUTH, MICHIGAN

A. S. T. E. DOINGS

● National A. S. T. E. Headquarters: 2567 W. Grand Blvd., Detroit 8, Mich. Telephone TYler 5-0145 National Officers: (1944-45 term): President, D. D. Burnside; 1st Vice-President, C. V. Briner; 2nd Vice-President, A. M. Sargent; 3rd Vice-President, W. B. Peirce; Secretary, E. V. Johnson; Treasurer, F. W. Eaton; Assistant Secretary-Treasurer, L. G. Singer; Executive Secretary, A. L. Potter.

● For application blanks and information pertaining to membership in the American Society of Tool Engineers, address the Secretary's office, 2567 West Grand Boulevard, Detroit 8, Michigan.

● Senior initiation fee is five dollars. Dues eight dollars per year for senior grade membership and five dollars per year for junior grade membership. Junior initiation fee is two dollars.

● **Buffalo-Niagara:** For the first time in two years, this chapter is staging a Summer Outing. The event, scheduled for August 24, will be held at Walker's Grove, Williamsville, New York.

● **Chicago:** Clifford Ives, Ives Engineering & Planning Company, will address the opening fall meeting, September 11. Ives, who is well known in the production engineering field, will speak on "Engineering, Planning and Tooling for Postwar Civilian Products". The talk will be illustrated with slides.

● **Dayton:** As in many another chapter, members here gathered last month for a mid-season outdoor event. The Ohio city staged its annual Fish Fry July 10, at the Inland Gun Club, with 125 participating in an evening-long session of entertainment, food and refreshments.

● **Detroit:** What may well prove one of the outstanding chapter technical meetings of the year was held here July 27, when four experts in the field of metallurgy participated in a round-table discussion on "Sub-Zero Transformation of Hardened Steels".

Participants in the discussion, held in the Rackham Memorial Building, included G. B. Berlien, Lindbergh Steel Treating Company; R. P. Kells and L. Grimshaw, Latrobe Electric Company; and Dr. Fletcher, Massachusetts Institute of Technology.

● **Fond du Lac:** Sub-zero refrigeration and treatment of metals was the subject of a technical session at the July 13, meeting, held at Reif's Mills, near Manitowoc. The discussion, heard by 100 members and guests, contrasted the results obtained in heat treating to 1800° or subjecting metals to temperatures of 120° below zero.

The chapter's Third Annual Outing, it was announced, will be held August 13, at Butte Des Morts Country Club, Appleton, Wisconsin.

● **Kansas City:** After a July and August recess, A. J. Mirick, Chapter Chairman, has announced, the first fall meeting will be held Tuesday, September 5.

● **Los Angeles:** Maintaining its record of outstanding and provocative technical sessions, 200 members and guests attending this chapter's July 13, meeting, heard Jerome P. Hamler, Musto-Keenan Company, Western Distributors for National Grinding Wheels, discuss the history, source and applications of industrial diamonds.

Tech. Sergeant George Ashworth, Army Air Corps hero, spoke before the presentation of recently-released air force movies.

In the meeting business session, Harold Miller, Chairman, Nominating Committee, announced the nomination of A. J. Denis, Carbide Tool Manufacturing Company, and Frank B. Bucklein, Chief Engineer, National Aircraft Equipment Company, for the office of Regional Director from the San Diego, Los Angeles and San Francisco area.

● **Northern New Jersey:** Tool Engineers from this area will gather August 20, at Doerr's Grove for an annual picnic, Chapter Chairman Edward Murphy has announced.

● **Rockford:** Frolicking and feasting were orders of the day when 130 members and guests from the mid-western machine tool center gathered at Svithoid Park, near Rockford, June 10, for their Annual Summer Stag.

● **San Diego:** Uses of laminated plastics in modern living and manufacturing were described and illustrated in a new color sound film, "The Formica Story", presented at the July 14, meeting. The film is produced by the Formica Insulation Company, Cincinnati.

Coffee Speaker Keith Monroe, Ryan Aircraft Public Relations, discussed the California Airline Feeder Service; while members also witnessed a pictorial history of aviation in a new film, "The Navy Flies On".

● **Seattle:** An inspiring description of naval combat with the Japs and an educational talk on carbide tool tips were contrasting features of the June 13, meeting, held at the Gowman Hotel.

After Commander Sass, USN, a veteran of submarine warfare in Pacific waters, presented a graphic picture of underwater fighting off the shores of Nippon, W. R. Slater, Firth Sterling Steel Company, showed a movie depicting the manufacture and use of his concern's carbide tool tips.

Chapter members gathered at Bremerton, Washington, July 7, for a special meeting following a tour of the great Puget Sound Navy Yard.

● **Springfield:** Western Massachusetts Tool Engineers held their Annual Clambake at Riverside Park, Agawam, June 17. The traditional New England event attracted 200 members and guests.

(Concluded on page 202)

TWIN CITIES OFFICERS AND COMMITTEE CHAIRMEN IN CONFERENCE WITH REGIONAL DIRECTOR

Officers and committee chairmen of the Twin Cities Chapter, called together for a special meeting late in May by Regional Director E. W. Dickett, met at the Nicollet Hotel, Minneapolis. *Front row*, left to right: George W. Wise, E. W. Dickett, Wm. E. Boken, Wallace A. Ahlberg. *Back row:* Walter H. Erskine, Clifford V. Lofdahl, Raymond L. Martin, Charles G. Adams, J. A. Harrington, H. L. Seaberg, and E. J. Buzicky.

IS THERE ANYTHING *Special* ON YOUR MIND IN THE WAY OF *milling cutters?*

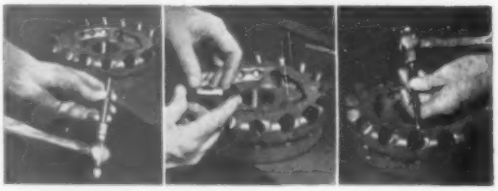
With a milling cutter line as complete as Lovejoy's, there is seldom need for special cutters. But . . . when that need does arise, it will pay to call on Lovejoy for their specialized knowledge on how to design and manufacture these specials to do your jobs *exactly!*

We have designed and built special milling cutters, boring tools, spot facing tools, etc., for the past 26 years, and every one has had that exclusive Lovejoy feature—*positive-locking** blades. This basic design pays off in increased production, less down time, less power consumption and greater accuracy.

So, whether you order special or standard Lovejoy tools, you can count on them doing the job, and doing it economically.

Our Catalog No. 26 illustrates the Lovejoy line of inserted-tooth cutters. Send for your copy today!

Lovejoy manufactures a complete line of inserted-tooth type products—all equipped with the famous Lovejoy positive-locking device to assure maximum production at minimum cost. The illustrations at the right show how simple it is to keep Lovejoy tools at highest cutting efficiency.



Tap out the wedge— Move the shoe down— Tap in the wedge—Grind

IT'S AS SIMPLE AS THAT!

Lovejoy TOOL COMPANY, Inc., SPRINGFIELD, VT., U.S.A.

MILLING CUTTERS | BORING HEADS | ARBORS | SPOT FACING TOOLS | COUNTERBORES | BORING BARS | SINGLE POINT TOOLS | TURRET TOOL POSTS

● **St. Louis:** As guests of A.S.T.E. National President D. D. Burnside and the Quick Meal Division, American Stove Company, more than 150 members toured the Division's plant here early in July. Escorted by Burnside, who is superintendent of the plant, local Tool Engineers watched the production of aircraft auxiliary fuel tanks and heavy ordnance items.

Members gathered July 22, for the chapter's Annual Stag Picnic; while a river boat ride is scheduled for August 18, Public Relations Chairman C. L. Miller has announced.

● **Toledo:** Climaxing its 1943-44 season, this chapter staged its Summer Jubilee at Highland Meadows Golf Club, June 20. Eighty of the 180 members and guests attending teed off for the golf tournament staged. Dinner, presentation of prizes and a floor show were other highlights of the event.

● **Wichita:** When the Kansans held their Summer Stag Picnic at Sim Park, July 18, more than 50 members attended. Dutch lunch and entertainment were features of the evening affair.

● **York:** More than 90 members of the Central Pennsylvania Chapter, their wives and guests, gathered at the Outdoor Club, June 13, for a dinner followed by talks delivered by Army officers from Aberdeen Proving Grounds.

Two weeks later, June 24, the chapter staged a Stag Picnic at Fisher's Grove. THE END

EDITOR

Wanted for American Society

of Tool Engineers Handbook

●

For information, write
E. W. Ernst, Publications Committee,
American Society of Tool Engineers,
2567 W. Grand Blvd., Detroit 8, Michigan

THE SURFACE PLATES THAT ARE ACCEPTED AS *STANDARD* BY DESIGNERS OF FIXTURES AND GAGES

MACHINE PRODUCTS CORP.

6771 E. McNICHOLS ROAD

DETROIT 12, MICH.

Manufacturers of Precision Angles, Parallels, Straight Edges, etc.

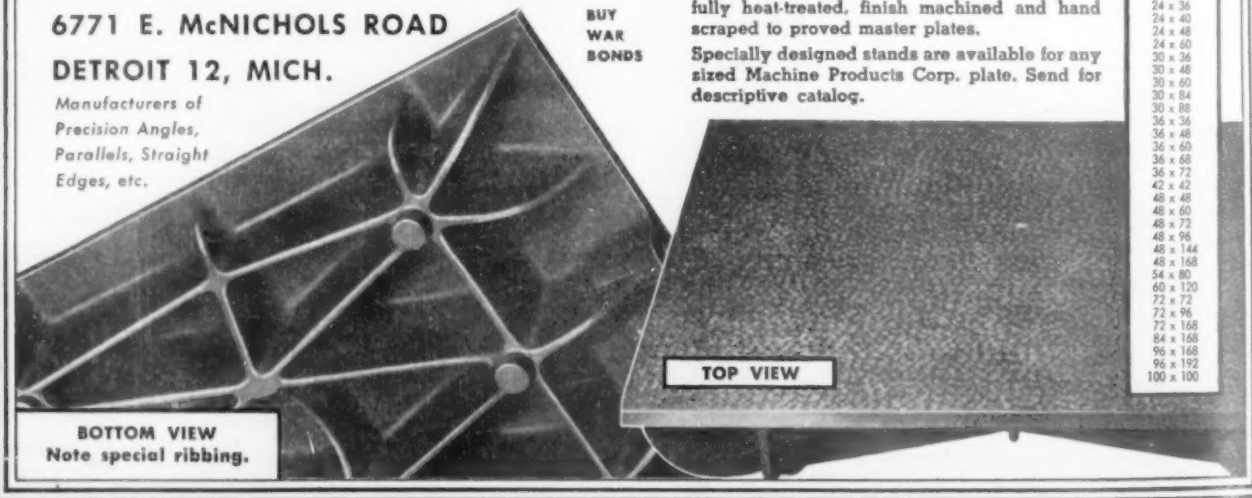
BUY WAR BONDS

Because these plates provide ample space for bolting fixtures to assure accuracy in checking and because they will stay as constructed without deflection, designers of checking equipment prefer Machine Products Surface Plates for built-up fixtures and gages. Made of uniform Meehanite iron, rough machined, carefully heat-treated, finish machined and hand scraped to proved master plates.

Specially designed stands are available for any sized Machine Products Corp. plate. Send for descriptive catalog.

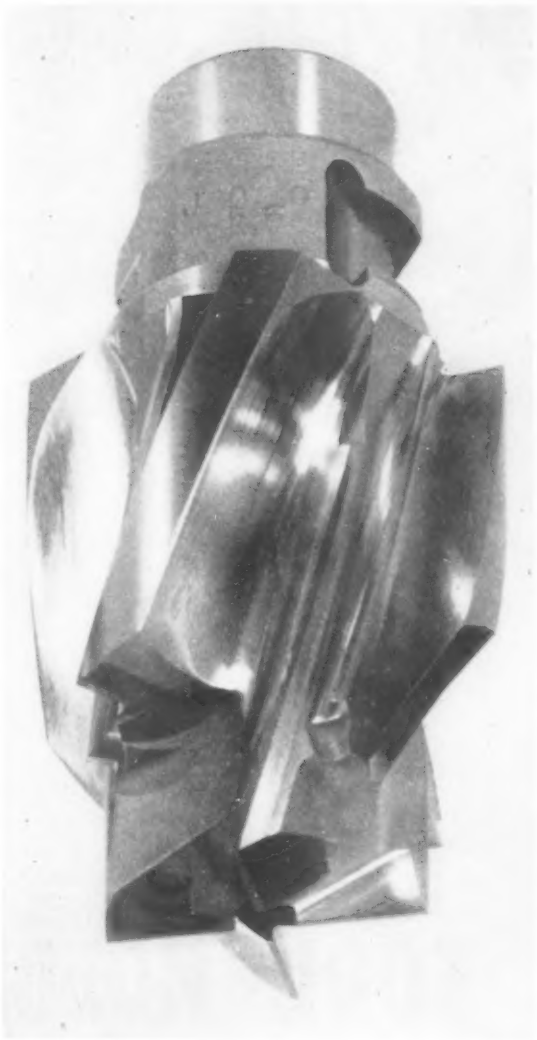
Wide Range of Sizes

7 x 7½
7 x 14
8 x 12
9 x 9
10 x 15
12 x 12
12 x 16
12 x 18
12 x 24
12 x 36
14 x 14
14 x 18
14 x 46
14 x 52
16 x 16
16 x 24
16 x 48
18 x 18
18 x 24
18 x 36
20 x 30
24 x 24
24 x 36
24 x 40
24 x 48
24 x 60
30 x 36
30 x 48
30 x 60
30 x 84
30 x 88
36 x 36
36 x 48
36 x 60
36 x 68
36 x 72
42 x 42
48 x 48
48 x 60
48 x 72
48 x 96
48 x 144
48 x 168
54 x 80
60 x 120
72 x 72
72 x 96
72 x 168
84 x 168
96 x 168
96 x 192
100 x 100

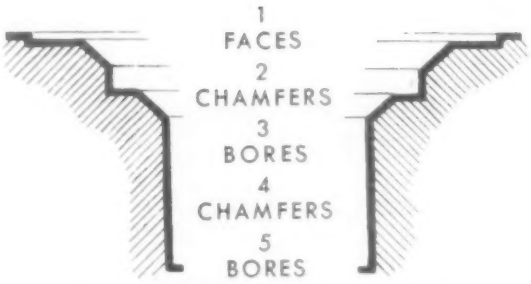


TOP VIEW

BOTTOM VIEW
Note special ribbing.



4 OPERATIONS FREE!



Five jobs in one pass — One machine charge! A typical high speed steel Eclipse, multi-diameter cutter with interchangeable radial drive.

This is a typical Eclipse application. Not only is the multi-diameter tool an original Eclipse development but our engineers are cooperating closely with industry engineers in applying the principle where a savings can be realized on jobs involving various combinations of counterboring, chamfering and facing.

Eclipse is likewise doing extensive work in the application of carbide tipped tools to multi-operation production jobs.

Do You Have

Eclipse's Catalog Number 43?

ECLIPSE COUNTERBORE CO.

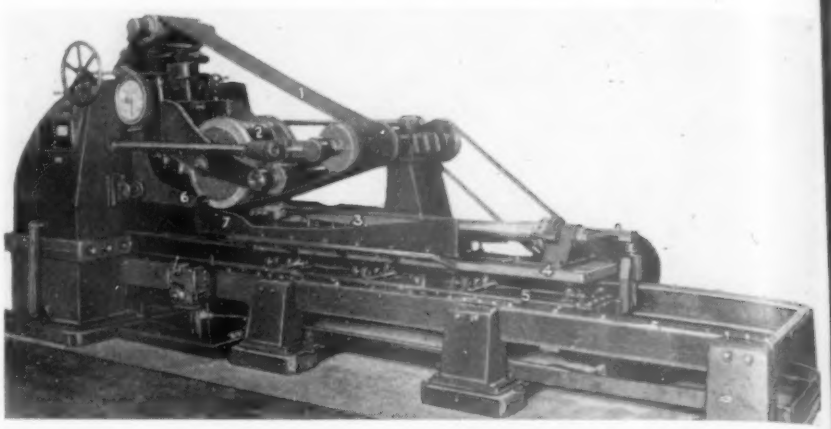
Founded thirty years ago

DETROIT AND FERNDALE, MICHIGAN

Special Unit Revolutionizes Blade Machining

EAST HARTFORD, CONN.—Hamilton Standard Propellers has placed in operation a five-ton machine to strop blades with astounding speed and accuracy. Production engineers in the United Aircraft Corporation's division believe the new special-purpose machine bids fair to revolutionize established production methods.

Propeller blades are stropped by the belt of the machine at a surface speed of 5000 feet a minute and to tolerance of .0001". The advance over present machining and hand grinding practices of shaping blades is believed the most outstanding change made in modern blade manufacture.



Hamilton Standard Propeller's new five-ton shaper which grinds and polishes duralumin blades by a continuous belt which has a surface speed of 5,000 feet per minute. The new special-purpose machine will maintain a tolerance of .0001". Numbers indicate: (1) Strop; (2) Forming Drum; (3) Propeller Blade; (4) Cradle; (5) Table; (6) Guide Rolls; (7) Tracks.

The continuous strip grinding machine, designed by Sigmund A. Czarnecki, staff assistant to the factory manager at Hamilton Standard, was produced by the Murray-Way Corporation, Detroit.

Efficiency of the new machine cuts the time and cost of processing a blade over previous standards tremendously. Engineers here say that under the least favorable conditions, the stropping machine accomplishes its task in less than 50 per cent of the time usually required for the same work. Time saved per blade exceeds an hour.

The machine is one of the very few sanding grinders in existence capable of grinding a variable surface, a problem presented by propeller blades which vary in width, thickness and angle throughout their length.

The strop, or continuous strip grinder, grinds longitudinally with the blade, running over and being guided by a forming drum synchronized with a table moving lengthwise through the rectangular frame of the machine. The drum suspended above the blade governs the pattern to which it is ground, and is changed for each blade design.

Both the face and back, or camber, of the blade are ground to accurate dimensions by duplication from contours of the drums, a different drum being used for each side of the blade.

Duralumin forgings to be ground are locked on ten adjustable pins of a cradle which is mounted on the movable table. The cradle can be twisted or

(Concluded on page 222)

THE AMERICAN TOOL HOLDER

3 *holds* 4

BIT SIZES IN **POSITIONS**

YOU NEED VERSATILITY LIKE THIS FOR MAXIMUM PRODUCTION ON TOOL ROOM LATHES

There is no need to carry a large stock of tool holder sizes if you have American Tool Holders on the job. These are available in four standard sizes, and each will hold ***three bit sizes in four positions***. They will handle the majority of light and medium duty jobs in any tool room.

A single bolt not only locks the head in any of the four positions, but also holds any of the three bit sizes with a wide, immovable grip.

For maximum versatility and production, specify American Tool Holders.

EDWARD BLAKE CO.

634 COMMONWEALTH AVENUE
NEWTON CENTRE 59, MASS.

Please send me folder covering the complete line of American Tool Holders.

Name..... Title.....

Company .....

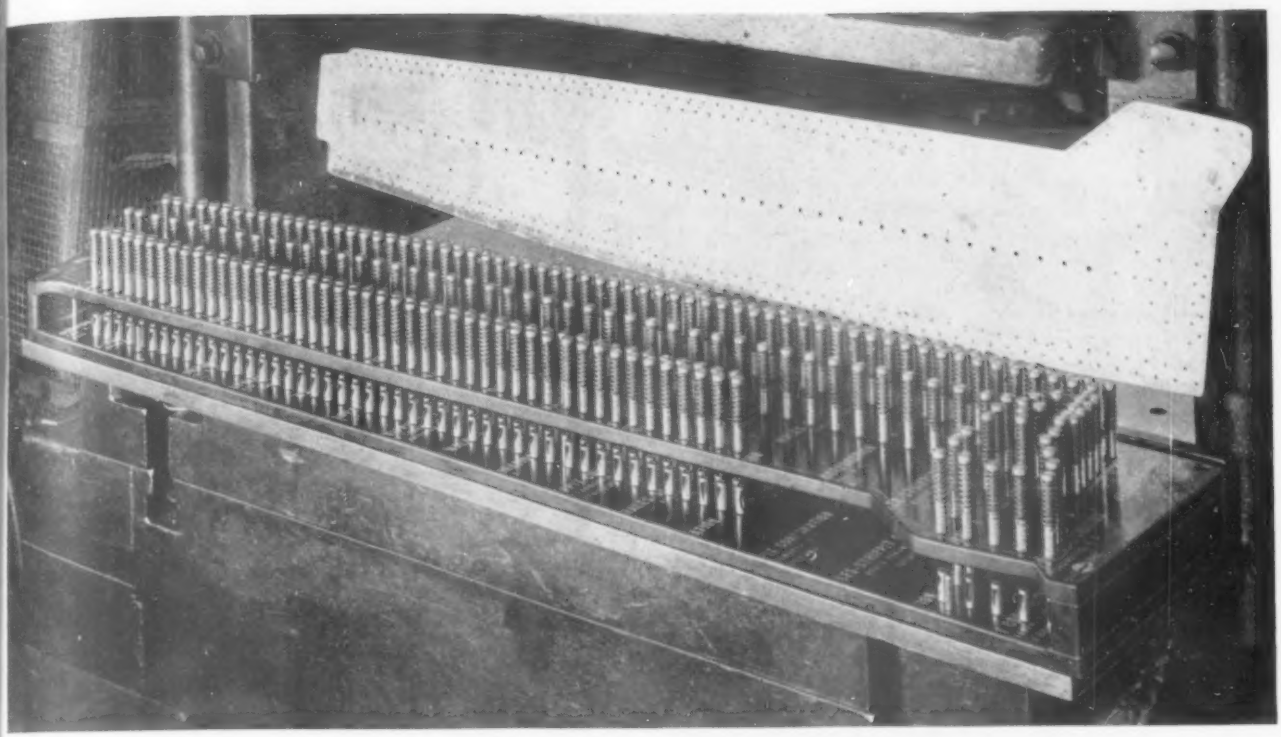
Street .....

City..... State.....

T.E.

AMERICAN TOOL HOLDERS—BLACK DIAMOND PRECISION DRILL GRINDERS—
BLAKE TAP GRINDERS—WALTHAM CUTTER SHARPENERS—
FILTAIRE PORTABLE DUST COLLECTORS

A NEW WAY TO PUNCH HOLES



Showing Wales Plate Set System that has punched 291 holes in part shown in background.

- **SIMPLE**
- **ECONOMICAL**
- **SAFE**
- **EASY, QUICK TO SET UP**

WALES *Plate Set System*

Wales Plate Set System is self-contained. No die setting skill . . . no adjusting . . . no aligning is required before or after the Assembly is placed on press bed.

Wales Plate Set System practically elminates "burring".

During the production run, punches may be replaced instantly without disturbing the set-up and without adjustments. Nothing is attached to press ram.

The time saving, money-saving advantages of Wales Plate Set System are fully described in Catalog PS. Write for your copy TODAY.

WALES-STRIPPIT CORPORATION

353 Payne Avenue

NORTH TONAWANDA, N. Y.

(Between Buffalo and Niagara Falls)

GEORGE F. WALES, President

Specialists in Punching and Notching Equipment

DON'T GUESS...

Be Accurate with ACME DRILL JIG BUSHINGS

There's no guesswork when your jigs are equipped with Acme Bushings. On the contrary, accurate drilling is assured, because drill jig bushings from Acme are produced by specialists in precision manufacture.

Acme offers two complete bushing standards, the A.S.A., *plus* the Acme standard line. Because of this you may be enabled to eliminate many special bushing requirements to save time and money.

You are invited to write for details on Acme's complete line of products and services offered to the precision working field.

ACME INDUSTRIAL CO.

Makers of Standardized Jig and Fixture Bushings

Telephone: MONroe 4122

208 N. Laflin St. Chicago, Ill.

"LOGAN"

SURE FLOW *Centrifugal* COOLANT PUMPS *For* MACHINE TOOL APPLICATIONS

Write For Catalog 61

LOGANSPORT MACHINE, INCORPORATED

902 PAYSON ROAD LOGANSPORT, INDIANA

Manufacturers of Air & Hydraulic Devices, Chucks, Cylinders, Valves, Presses, Accessories

Rawhide PROTECTS

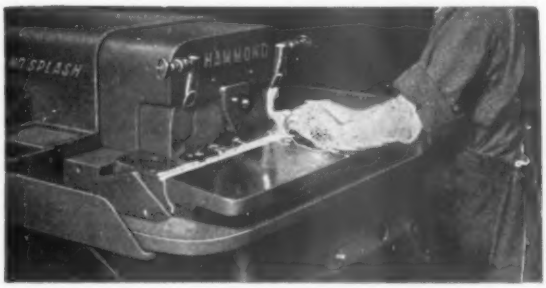
The tough, resilient, coiled rawhide faces of C/R Hammers and Mallets strike effective blows without battering or marring... protects finished surfaces, machines delicate insulation and parts. Speed die-setting, assembly, no fatiguing re-coil. Reduce breakage and spoilage. Sizes and weights for every need.

C/R Hammers have permanent malleable iron heads which take replaceable insert faces of coiled mechanical rawhide.

CHICAGO Rawhide MFG. CO.

1393 ELSTON AVE. ★ CHICAGO, ILLINOIS

New! Hammond SAFETY FEATURE!



New safety cup disc, standard equipment, is the greatest safety unit ever installed on any carbide tool grinder. It prevents the operator getting fingers, or dropping tools, into cup of cup wheel. It is an integral part of cup wheel hood design, adjustable for wheel wear. Investigate . . . compare! Hammond's complete line, from chip breakers to 20" grinders, gives you complete facilities for carbide tool maintenance.

Hammond Machinery Builders INC.

KALAMAZOO 54, MICHIGAN

WRITE FOR COMPLETE CARBIDE BULLETIN

1636 DOUGLAS AVENUE

Eastern Branch: 71 W. 23rd St., New York, 10, N. Y.

6 DAYS DELIVERY

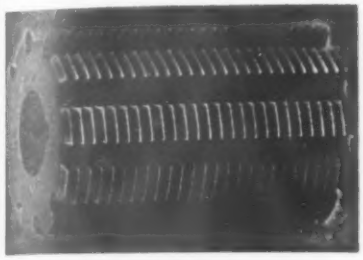
For first shipment on accepted orders on

THREAD MILLING CUTTERS (HOBS)

EXPANSION- AND RADIAL RELIEVED FORM CUTTERS

Regular or interrupted tooth form

CIRCULAR THREAD CHASERS



INVOLUTE SPUR GEAR CUTTERS

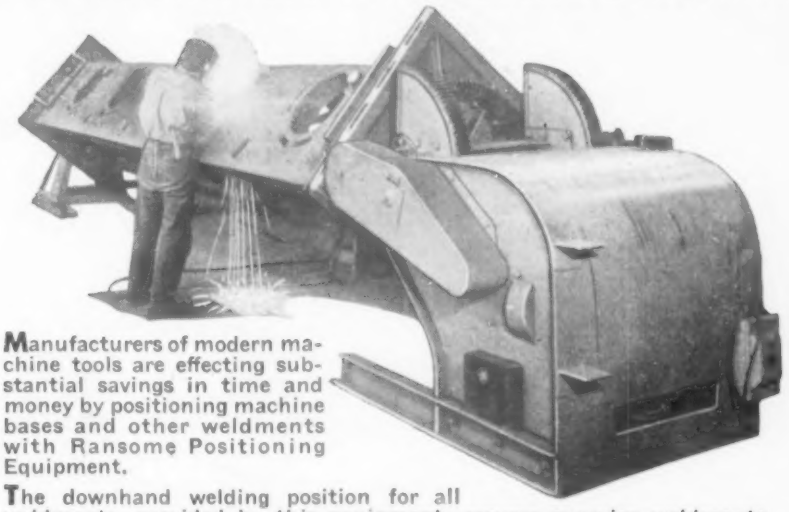
14½°; 20° & 25° P. A.

Send Blueprints and Specifications

U. S. Machine Tool Mfg. Corp.

Clinton, Indiana Phone 85

WELDED CONSTRUCTION IN MODERN MACHINE TOOL DESIGN CALLS FOR PROPER POSITIONING



Manufacturers of modern machine tools are effecting substantial savings in time and money by positioning machine bases and other weldments with Ransome Positioning Equipment.

The downhand welding position for all weldments, provided by this equipment, assures superior weldments in less time, using a heavier rod and reducing rod waste.

Economy and quality in manufacturing is necessarily part of your post-war plans. Investigate this modern production method. We will be glad to provide the proper equipment for your particular job.

WRITE FOR DETAILS—OUTLINE YOUR SPECIFIC PROBLEM

INDUSTRIAL DIVISION **Ransome MACHINERY COMPANY**

DUNELLEN, NEW JERSEY

SUBSIDIARY OF WORTHINGTON PUMP AND MACHINERY CORPORATION

STURTEVANT QUALITY

„Why be Satisfied with LESS than Sturtevant Quality?

In any operation requiring the accurate control of torque on vital nuts, screws, bolts, hydraulic fittings—of all threaded parts—have the advantages of Sturtevant permanently accurate Torque Wrenches.

1. Clear faced dials—readable from any angle.
2. Permanent accuracy—Longer Life.
3. No friction, adjustments moving parts or fragile mechanisms.
4. Practically indestructible.
5. Sturtevant pioneered design and quality throughout.

BUY MORE BONDS

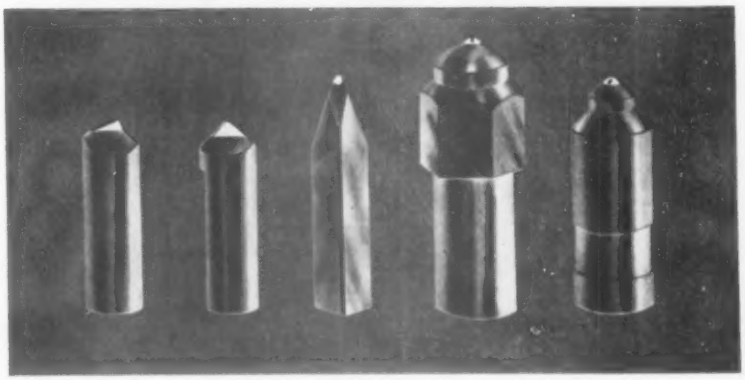
Because Sturtevant Torque Wrenches are PERMANENTLY accurate, the vast majority of torque wrench users standardize on "STURTEVANT".

NO FRICTION ADJUSTMENTS MOVING PARTS FRAGILE MECHANISMS

Over 50 models and types from 0-40 inch ounces to 7200 inch pounds.

P A STURTEVANT CO. ADDISON QUALITY ILLINOIS

DIAMOND-POINTED **ADAMANT** PRECISION TOOLS



FOR EVERY INDUSTRIAL REQUIREMENT

● Wheel Dressing Tools — carefully selected, hard, sound diamonds — expertly mounted to withstand the rigors and hard knocks of today's increased production schedules.

● "DIATIPT" Shaped Diamond Cutting Tools for precision turning and boring. Unexcelled for machining bearing metals, copper, aluminum, hard rubber, Bakelite, celluloid and other abrasive materials.

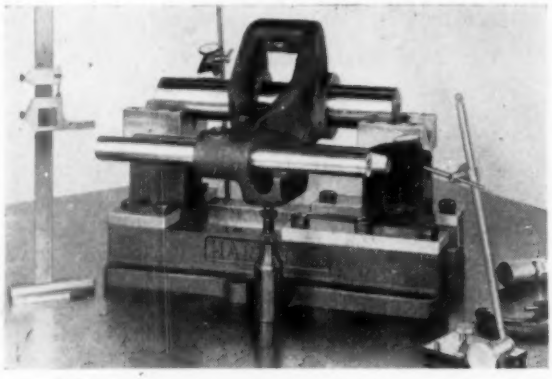
● All diamonds set in our permanent mounting which will hold the diamond securely thru-out the complete life of the tool.

ADAMANT TOOL COMPANY

MAIN OFFICE
P. O. BOX 215,
BLOOMFIELD, N. J.

CHICAGO SALES OFFICE
209 SOUTH STATE STREET
CHICAGO, ILL.

HARTFORD V-BLOCK
FOR
RAPID ACCURATE INSPECTION



• Here is the Hartford V-Block fixture set up on a surface plate. Many inspection departments could use one for similar setups. After the casting is completely machined, it may be accurately checked for parallelism of bored holes and milled faces, as well as for accuracy of hole spacing.

WRITE FOR LITERATURE

THE HARTFORD SPECIAL MACHINERY CO.
HARTFORD, CONN.

A. C. E.
SPECIAL CUTTING TOOLS

Made to your blueprints with precision accuracy and fine workmanship, A.C.E. special cutting tools provide long cutting life. Send us your inquiries for prompt estimates. Bulletin on request.

AMERICAN CUTTER
AND ENGINEERING CORP.
31751 MOUND ROAD, WARREN, MICH.

TO HELP YOU TEACH THE NEW GRINDER HAND

how to get maximum service from your Diamond Tools—we have some effective training material. Send for it. No obligation.

KOEBEL DIAMOND TOOL CO.
9442 Grinnell Ave., Detroit

KOEBELITE
DIAMOND TOOLS

Multi-Point, Multi-Set, Multi-Edge, and Single Set. Diamonds for All Industrial Purposes.

HEAVY BEVEL SAFETY
(Reg. Trade Mark)

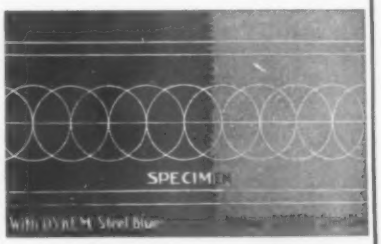
LETTERS and FIGURES

Deeper, clean impressions. Will not spall, will not mushroom. Any size character from 1/32" up.

Immediate delivery
Write for data!

M.E. CUNNINGHAM CO.
SAFETY STEEL STAMPS
169 Carson St., Pittsburgh 19, Pa.

DYKEM STEEL BLUE

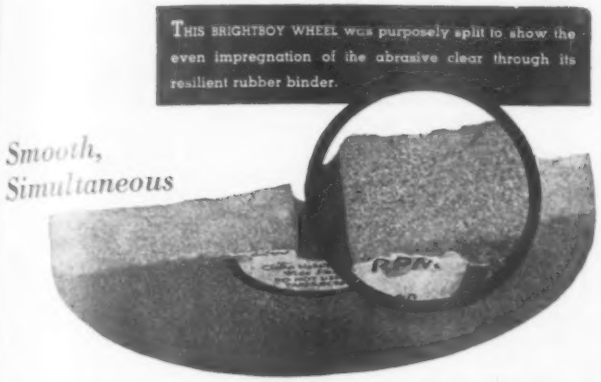


STOPS LOSSES
making dies & templates

simply brush on right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information

THE
DYKEM COMPANY
2301-D North 11th St., St. Louis, Mo.
In Canada: 444 Pacific Ave., Toronto, Ont.


THIS BRIGHTBOY WHEEL was purposely split to show the even impregnation of the abrasive clear through its resilient rubber binder.
Smooth,
Simultaneous

BURRING • FINISHING • POLISHING

Rubber-Cushioned **Brightboy** Does It!

Brightboy's balanced rubber and abrasive combination enables you to cover simultaneously the production steps between the grind and the buff. Write for production literature describing Brightboy's labor-saving shortcuts, and for price lists and catalogue, illustrating Brightboy shapes and sizes for machine and manual applications. Brightboy dealer representatives and service men will gladly cooperate with you on any special production problems.

BRIGHTBOY INDUSTRIAL DIVISION
Weldon Roberts Rubber Co. **Newark 7, N. J.**

WELDON ROBERTS
Brightboy

Send for Valuable Booklet

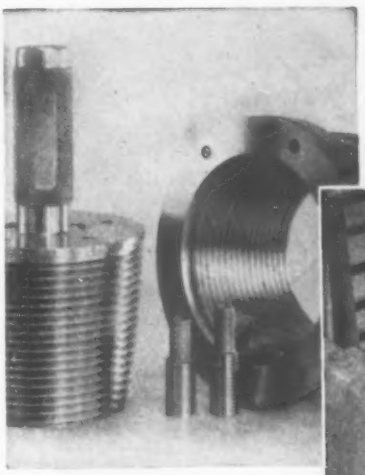
Forgings For All Industries
Rough Turned or Finished Complete

Composite Die Sections
Extrusion Tools
Crankshaft Forgings
Gear Forgings
Die Casting Dies

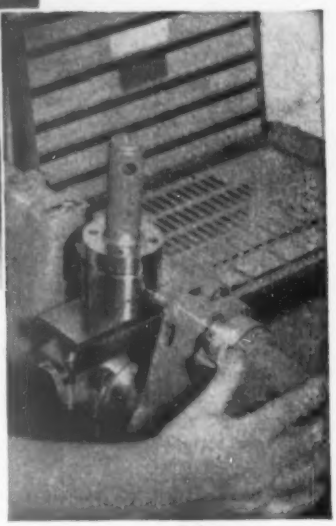
Rings, Discs, Blocks, Shafts, Hubs, Bars, and Special Shapes.
Tool Steel Forgings
S.A.E. and N.E. SPECIFICATIONS
Stainless & Copper Forgings
May we Serve You?

AJAX STEEL & FORGE CO.

205 ADAIR STREET **DETROIT, MICHIGAN**



PRECISION-PERFECT

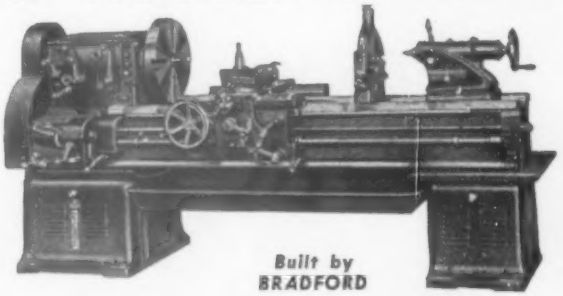


Behind Axelson Gages is the experience of 52 years. Expert craftsmanship, variation-proof metals, and every scientific gage-making facility *guarantee* the accuracy of Axelson Gages. Quick deliveries possible.

THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

AXELSON MANUFACTURING COMPANY
Box 98, Vernon Station,
Los Angeles 11, Calif.

The Metalmaster FOR GREATER EFFICIENCY



***Built by* BRADFORD**

★ This Bradford lathe embodies all of the latest features of design that make for precision, endurance and low-cost production.

★ Stamina, quality engineering, and long life are cardinal features that make this lathe a leader in efficient operation.

Also manufacturers of drilling and tapping equipment

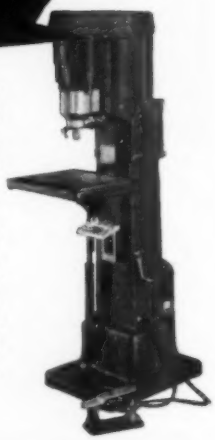
1840 - 1944

Bradford's experience in building metal-working machinery covers more than a century.

THE BRADFORD MACHINE TOOL CO.

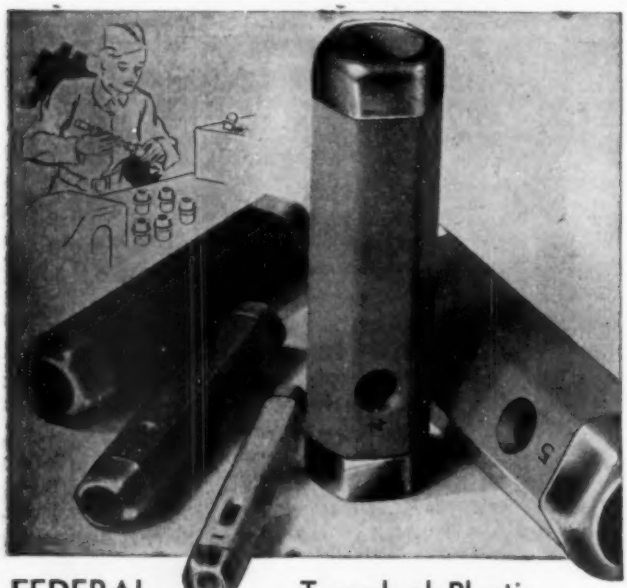
EVANS STREET SOUTH OF EIGHTH CINCINNATI, OHIO
PRECISION TOOLS SINCE 1840

THE *Right* MACHINE
THE *Right* FIXTURE



Insure continuous, trouble-free tapping production The HASKINS Way, combining Haskins AIR CONTROL with the right fixture. Add Piece Part Control and you approach completely automatic tapping. Placing the part in the fixture actuates a micro-switch—AIR does the rest. Each piece is tapped uniformly, precisely—faster than by any other method. For complete information on high speed tapping The Haskins Way, send for our latest catalog. R. G. Haskins Co., 2756 W. Flournoy St., Chicago, Ill.

HASKINS *Haskins*
PRECISION TAPPING EQUIPMENT



FEDERAL Taperlock Plastic
GAGE HANDLES

Federal Plastic Gage Handles give gages a more sensitive touch because they are lighter than any metal. They reduce fatigue and insulate from body heat, safe-guarding accuracy. ¶ Marked for identification with the same stamps used for marking metal handles. ¶ Ideal for Glass Gages which require Handles of light weight for best results, reducing danger of breakage as well as adding to sensitivity. ¶ Available in seven standard sizes and in colors—Red, Yellow, Green and Black for easy identification. ¶ New low prices represent a real saving. ¶ Now available for smaller gages—size 00 in same colors.

IMMEDIATE SHIPMENT

FEDERAL TOOL CORPORATION
402 North Leavitt St. CHICAGO 12, ILLINOIS

In War, as in Peace . . .

CERRO ALLOYS

SAVE TIME and CUT COSTS!

CERROMATRIX (Melting Temp. 250° F.) For securing punch and die parts, anchoring machine parts without expensive drive fits, short run forming dies and other metal-working applications.

CERROBEND (Melting Temp. 158° F.) Used as a filler in bending thin-walled tubing to small radii. Easily removed in boiling water. Also used for aircraft assembly jigs, templates for forming dies and other purposes.

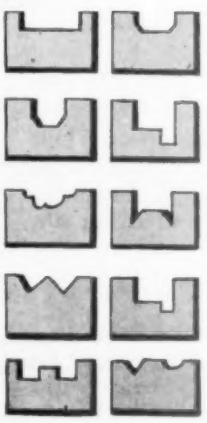
CERROSAFE (Melting Temp. 190° F.) Used to accurately proof-cast cavities such as molds, gun chambers, forging dies, etc. and for many similar applications.

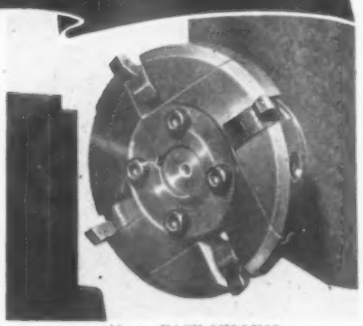
REPRESENTATIVES AND DISTRIBUTORS

ANSONIA, CONN., Jackson Associates.
BOSTON, MASS., Jackson Associates.
PHILADELPHIA, PA., Castaloy Metal Sales Company.
BROOKLYN, N. Y., Belmont Smelting & Refining Works.
CHICAGO, ILL., Sterling Products Co., Inc.
CLEVELAND, O., Die Supply Co.
DALLAS, TEX., Metal Goods Corporation.
DETROIT, MICH., Castaloy Metal Sales Company
HOUSTON, TEXAS, Metal Goods Corporation.
KANSAS CITY, MO., Metal Goods Corporation.
LONDON, ENG., Mining & Chemical Products, Ltd.
LOS ANGELES, CAL., Castaloy Metal Sales Company.
MILWAUKEE, WISC., Harry C. Kettelson, Inc.
MINNEAPOLIS, MINN., Northern Machinery & Supply Co.
MOLINE, ILL., Sterling Products Co., Inc.
MONTREAL, CAN., Dominion Merchants, Ltd.
NEW ORLEANS, LA., Metal Goods Corporation.
ST. LOUIS, MO., Metal Goods Corporation.
TULSA, OKLA., Metal Goods Corporation.

CERRO DE PASCO COPPER CORPORATION
40 WALL STREET - - NEW YORK 5, N. Y.

Newfield UNIVERSAL FLY CUTTER





Above: FACE MILLING

Above—a few of the many cuts that can be made with the Newfield Universal Fly Cutter in ONE operation on a horizontal or vertical mill or drill press. Individually adjustable bit holders permit slots of any shape to be cut 3/16" to 1-1/2" wide.

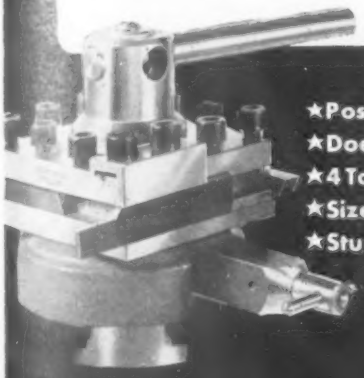
STANDARD BITS MAKE 4 TO 6 DIFFERENT CUTS IN 1 OPERATION!

For many types of milling, light metals and plastics as well as steel, there is no longer need for special cutters. A single Newfield Universal Fly Cutter, utilizing any type of standard high speed steel or carbide bits, makes multiple cuts in one operation. In contrast with expensive specially ground cutters, the standard bits used in the Newfield are easily and quickly ground in your own shop, readily replaced or reground for other work, at small cost. There is practically no down-time if a bit is broken.

The Newfield fits all standard arbors, turns to any required speed for fly cutting, slotting, surface and straddle milling, gear cutting, disc and gasket cutting. Standard sizes are 4", 6", 8", 10". Write for details of this versatile, production-upping, money-saving tool.

NEWFIELD MACHINED PARTS COMPANY
7160 Melrose Avenue, Los Angeles 46, California

Get More Production from the Same Lathe... with Colwell Turrets.



★Positive Indexing
★Does Precision Work
★4 Tool Changes
★Sizes for All Lathes
★Sturdy Construction

Specify the Turret with the Built-In Cutting-Off Tool

S. G. COLWELL
25 Congress Ave., Prov., R. I.

PRODUCTO SERVICE
IS AVAILABLE BY TELEPHONE!

For prompt service on Producto die sets and accessories call one of the following:

Assembly Plants and Warehouses

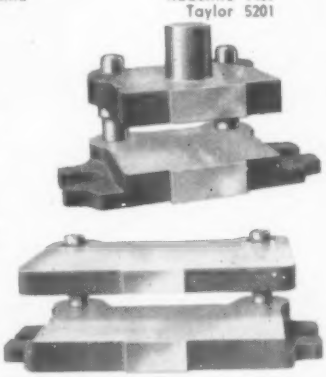
Bridgeport, Connecticut	4-9481
Detroit, Michigan	Plaza 3101
Cleveland, Ohio	Express 1133
Indianapolis, Indiana	Lincoln 1696
Los Angeles, California	Trinity 9827

Sales Offices

New York City	Canal 6-6131
Buffalo, New York	Cleveland 1110
Syracuse, New York	3-1181
Philadelphia, Pennsylvania	Radcliffe 1467
Dayton, Ohio	Taylor 5201

PRODUCTO DIE SETS

Quick service on all Special Die Sets and Bolster Plates from Bridgeport and Detroit.

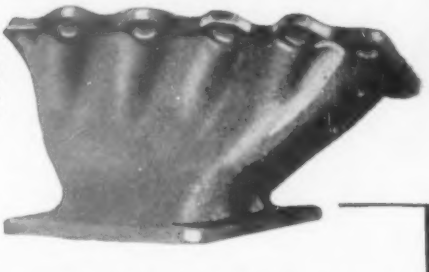


THE PRODUCTO MACHINE CO.
990 Housatonic, Bridgeport 1, Conn.

Write for Catalog No. 9

How would you do it?

Spherically mill the 18 holes in the bolting flanges of this complex carburetor adapter, accurately and at high speed.



Here Is MOLINE'S Answer!

These two special milling machines (below) are typical MOLINE solutions for a difficult machining problem. Designed and built by MOLINE for an aircraft engine manufacturer they have greatly increased the production of these essential aircraft parts. Present restrictions prevent our stating pieces per hour, or increase in output.

When the M-31 Miller (12-spindle, 2-way machine) operates, each of the two sliding carriages, moves in from the right and left to center each of the rotating cutters over a hole to be milled. With all cutters in working position, the fixture moves upward to feed the cutters into the work after which the fixture returns to the starting point, and all cutters return to their initial positions where cutter rotation stops. The work piece then is removed and the fixture is ready for a new piece to be loaded into position.

The M-30 Miller operates on the same principle as the M-31, except that it is a 6-spindle, 4-way machine. The two main horizontal slides carry four of the cutters and a fifth moves in from the rear (behind the work piece shown in the fixture). The sixth is on the lower end of the vertical spindle which is operated by a lever to bring the cutter into working position. This cutter, at the end of the operation, is moved up out of the way by this same lever as a part of the unloading operation.

Control of the functions of both machines is by electric push buttons.

If you have a tooling problem on drilling, boring, boring, milling or tapping, no matter how unusual, submit it to MOLINE.

NEW! EMERGENCY SET

SOLVES PLUG GAGE PROBLEMS

PRICE $67.50

FOR COMPLETE SET OF 36 BLANKS AND 7 HANDLES IN CASE

The NEW Atlantic Emergency Set contains 36 cylindrical plug gage blanks in steps of 1/16" with handles, which will enable you to make any size plug gage from .029" to 1.010" in just a few minutes work on a cylindrical grinding machine. Our blanks are oil hardened throughout, shank finish ground and centers on both ends are lapped. Thus only the O. D. must be finished by grinding when gages of commercial finish are required and by lapping for gages of higher standards.

WRITE FOR FOLDER

GEORGE SCHERR CO., INC. 418-8 Broome St. New York 12, N. Y.

Output Increased with TUBULAR RIVETS

Don't use solid rivets — use tubular rivets with Chicago Automatic Rivet Setters, because tubular rivets with Chicago equipment speed up production and lower unit costs. Get all the facts, especially on your war products. Even though small solid rivets are specified, send us sample assemblies so that we can fasten them with proper tubular rivets and give you a production schedule. Then submit the tubular riveted assembly for governmental approval and you will invariably receive an O.K.

A typical fast operating machine that automatically feeds, inserts and clinches a tubular or split rivet with each pedal operation. Other machines available for setting up to 4 rivets at a time — bench and pedal types.

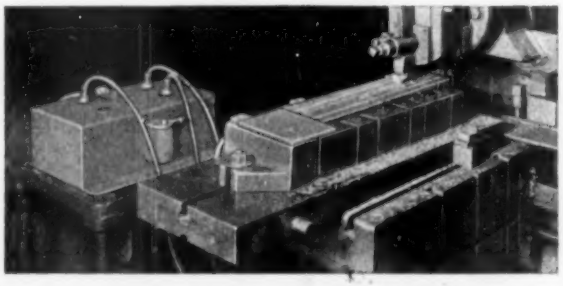
Chicago Rivet AND MACHINE CO.

9622 W. JACKSON BLVD., BELLWOOD, ILL. (Chicago Suburb)

TUBULAR AND SPLIT RIVETS IN ALL RIVET METALS

POWER-GRIP

PLANER SET UPS WITH MAGNETIC CHUCKS



"The above has been in use long enough, over a representative number of sizes of gibs, to report a saving in floor to floor time on machining, of an average of 37% over our old fixtures."

—E. E. HALLBERG, Rockford Machine Tool Co.

Another plant is PLANING airplane propellers on 84 POWER-GRIP Chucks

• Look into the possibilities of POWER-GRIP holding for your own production problems. Send print or sample for our suggestions.

Our Chucks operate from 110-volt A.C. transformed through our efficient enclosed dry plate control unit to only 6 volts D.C., which energize the chuck—no shocks, no heat, and no burned out chucks or controls.

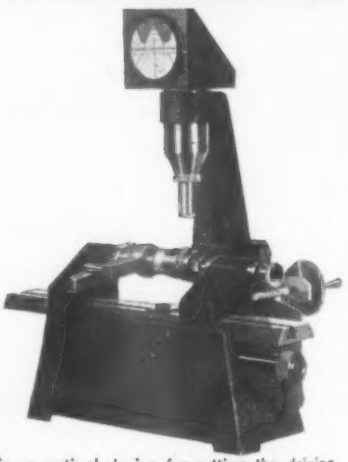
ILLUSTRATED CATALOG AND PRICES ON REQUEST

ROCKFORD MAGNETIC PRODUCTS CO.

1015 Sixth Ave. — Rockford, Ill.

New THREAD PICK-UP PROJECTOR INCREASES GRINDER PRODUCTIVITY AS MUCH AS 50% . . . SOMETIMES MORE!

- Reduces grinding time
- Wheel and Diamond Life greatly prolonged
- Stock removed equally from both flanks
- Salvages threaded parts oversize .0003 or more
- Beginners can use expertly—quickly



The Thread Pick-up Projector is an optical device for setting the driving dog on pre-threaded work. Allows grinding wheel to enter trough of thread to remove finishing stock from both flanks accurately and without adjustment. Lead is picked up while previous piece is being ground — *no time is lost.* Viewing screen enlarges thread for quick, accurate check of root depth and angle. Picks up A.N., Acme and Whitworth threads. Operates in conjunction with any thread grinder.

Write for BULLETIN NO. 441 today!

ACME

ACME INDUSTRIAL CO.

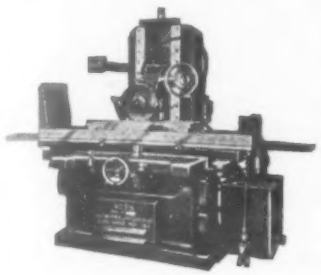
SCIENTIFIC DIVISION

208 N. Laflin St. • Monroe 4122 • Chicago 7, Ill.

SPEED & PRECISION

with

Grand Rapids Hydraulic Feed Surface Grinders



While keeping pace with the Defense Program Grand Rapids Grinders are maintaining the features that have made them one of the leading machine tools of the Nation.

One piece base and column insure accuracy at high speeds attainable on all Grand Rapids Grinders.

Write for Catalog GL-100

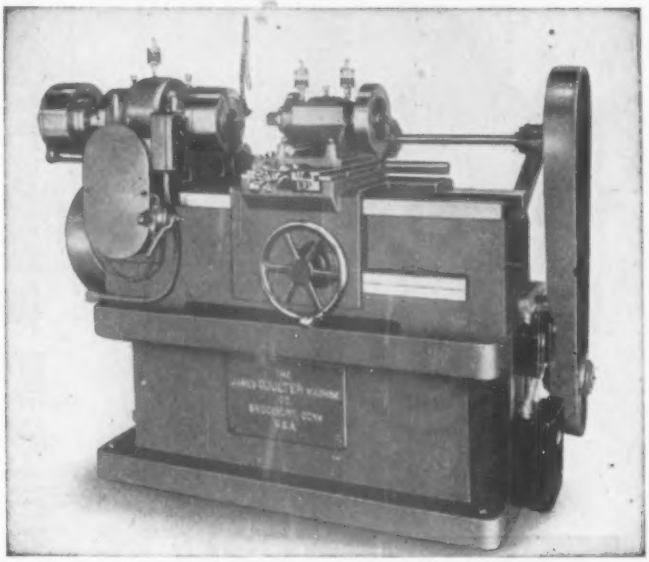
GALLMEYER & LIVINGSTON CO.

110 Straight Ave., S. W.

GRAND RAPIDS 4 MICHIGAN

PRECISION THREAD MILLER

FULL AUTOMATIC CONTROL



INTERNAL OR EXTERNAL RIGHT OR LEFT — UP TO 7 INCH DIAMETERS
COMPLETE MOTOR EQUIPMENT — FIXTURE TO SUIT

The James **COULTER** *Machine Co.*

BRIDGEPORT • CONNECTICUT • U. S. A.

The first installment of HOBART'S ARC WELDING *DESIGN* service is—

A really practical idea service—ideas that are readily adaptable to your use—ideas that will help you use arc welding to best advantage. Write today, we will gladly send you this service.

HOBART BROTHERS CO.
BOX TE-84, Troy, Ohio

HOBART *Simplified* arc welders

"One of the World's Largest Builders of Arc Welders"

Free data sheets show why you avoid costly breakdowns in equipment you build or buy

...with parts of wear-resisting

Ampco Metal

The condensed experience of over 2,000 users in war and peace!

Valuable data to keep you posted on the possibilities of Ampco Metal—the remarkable aluminum bronze alloy that has been adopted by foremost machine-tool builders—where they need exceptional strength, or resistance to wear, shock, and fatigue.

File 41 of Engineering Data Sheets contains practical information on a wide range of applications of Ampco Metal. Catalog 23 describes in detail the properties of the various Ampco grades, and illustrates a variety of parts made from each.

Send for this material today. Available to you without charge. M-8

Tear out coupon and mail today!

AMPCO METAL, INC.
Dept. TE-8, Milwaukee 4, Wisconsin

Please send me File 41 of Engineering Data Sheets and copy of Catalog 23.

Name..... Position.....

Company.....

Address.....

City..... (.....) State.....

AMPCO Metal
The Metal without an Equal

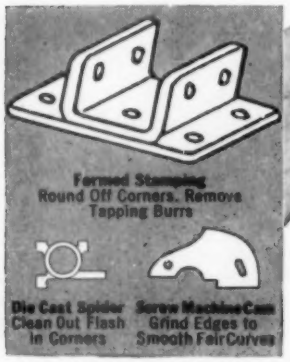
GAMMONS
OF
Manchester

PRODUCTION TOOLS

ORIGINATORS AND
MANUFACTURERS OF HELICAL
FLUTED TAPER PIN REAMERS

THE GAMMONS-HOAGLUND CO., MANCHESTER, CONN.

18 WAYS TO SAVE
TIME & MONEY!
with the
Mead Industrial Burring Machine



For METAL — WOOD
PLASTIC

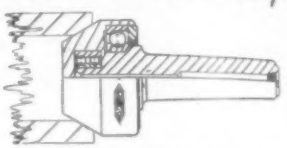
New circular explains, illustrates 18 ways in which the Mead Industrial Burring Machine saves time and money — also contains special Grit Guide. Every industrial plant needs this "Jack-Of-All-Trades" machine. Your burring can be done in "free time" — install these machines by every machine tool which leaves burrs. Grinds, finishes both outside and inside cut-out openings. Immediate delivery in most cases. Write for the informative Money-Saving circular now.

MEAD SPECIALTIES COMPANY

15 SO. MARKET ST. DEPT. 84-T CHICAGO 6, ILL.

LIVE CENTER *adapted to tube turning*

The basic design of the STURDI-MATIC Live Center is ideally adapted to tube turning . . . extra large sections are no problem with this set-up . . . in most of these cases (see mechanical drawing) there is a tool clearance. . . . Characteristic of all STURDI-MATIC design is this low overhang which together with a slight cushioning action, that compensates for expanson, due to heat, shock and excessive thrust loads—reduces wear to a minimum . . . we will see that your job gets set-up with the right LIVE CENTER. . .



Special LIVE CENTER for turning extra large tubing.

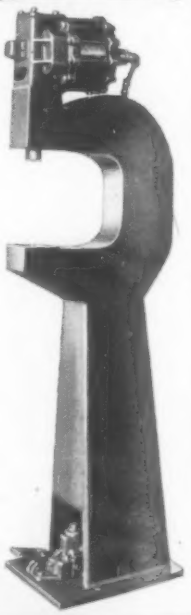
STANDARDS with Morse tapers (2 to 6) carried IN STOCK.

STURDIMATIC
TOOL COMPANY
5218 THIRD AVE. DETROIT, MICH.

HAVE A HANNA RIVETING PRESS

Tailored to YOUR Job!

. . . for
better riveting, faster



When you want maximum production and good clean riveting on a job—have Hanna build a riveting press *especially* for it. Hanna has had over 40 years experience in designing and building riveting presses for all types of applications. They have produced over 500 styles and sizes, pneumatic and hydraulic, to handle rivets from 3/16" to 1-1/2" in diameter. The 15 ton Hanna Press shown here has a 12" reach, 12" gap and will drive 5/16" diameter rivets cold; it solved a special riveting problem.

Discuss your riveting requirements with Hanna — just send a description of your work with blue prints—or a sample if you can.

Send for Hanna Riveting Catalog No. 232.

HANNA ENGINEERING WORKS
1765 ELSTON AVENUE • CHICAGO 22, ILLINOIS
RIVETERS • CYLINDERS • VALVES • AIR HOISTS

IMMEDIATE DELIVERY

AUTOMATICS

Acme, 5/16" Model C, 5 spdle, M.D.
Cleveland, 1, 1½, 2½, 2¾ & 3¾" Model A
Cleveland, ⅜, 1½ & 2½" Model B
Cleveland, 1¼ & 1½" 4 spdle, Model M
Cone, 1¼ & 1½" 4 spdle, M.D.
Gridley, 2¼, 3¼ & 4¼" S.S.M.D.
Gridley, 9/16, ⅞ & 1¼" Model G, M.D.
Gridley, ¾, 1¼ & 2¼" Model F, M.D.
Potter & Johnston, No. 5A & 6A M.D.

GEAR MACHINERY

Barber Colman No. 3 & 12 Hobbers
Fellows Shapers, No. 6 & No. 7 H.S.

GRINDERS

Blanchard No. 16A R.S. with 30 x 18" Magnetic Chuck, 30 H.P. A.C. Motor
Landis 6 x 18 & 10 x 36" Landis Plain, M.D.
14 x 36" Norton Plain, M.D. type 88I.
Webster & Perks, 10" x 30" Universal

LATHES

Putnam, 60" x 17" with 12" Riser Blocks
Warner & Swasey Turret No. 2 & 4 M.D.

MILLING MACHINES

Becker Vertical No. 5 & 6—Model C
Becker Vertical, Model SD, 40" Rotary Table
Brown & Sharpe No. 2 Universal

USED & REBUILT

MACHINE TOOLS — POWER PRESSES

OTT MACHINERY SALES INC.

546 Second Ave. — Detroit 26, Mich.

Phone: Cadillac 3103

LESS OPERATIONS AND FAR BETTER WORK WITH A GATCO

ROTARY PILOT BUSHING

Pilot bushing fits with a PUSH fit, therefore a perfect bore

ROUND-CHATTERLESS-SMOOTH

DUST-PROOF — AS A WATCH

GATCO Rotary jig and pilot bushing is built for core drilling, diamond boring, turret tool piloting, piloting hollow mills, line reaming, carbide boring, spot facing, etc.

Write for full information and prices

GIERN & ANHOLTT TOOL COMPANY
1308 Mt. Elliott Avenue, Detroit 7, Michigan

A Better Job More Safely Done

Photographed at Clearing Machine Corp.

C-F Positioners permit more welding in the same time, more safely, save crane and sling crew time, save floor space. It's stronger, better welding, too,—uniformly stronger joints and smoother, neater fillets and beads which eliminate excessive grinding.

Permit you to make downhand welds on all sides, surfaces and angles with a single setup, to use large rods that require fewer passes. Table revolves 360°, tilts to 135° beyond horizontal—adjustable for height. C-F Positioners are provided in capacities to 30,000 lbs. hand or push-buttons control operation. Table rotation from 0 R.P.M. up. Padestal or boom mounted to give maximum floor and working clearance.

Write for Bulletin WP-22

CULLEN-FRIESTEDT COMPANY
1318 So. Kilbourn Ave. — Chicago 23, Ill.

Redmer AIR CHUCK

Accurately holds to depth at the same time it automatically centers parts for drilling, milling, tapping, etc. Needed in every plant where second operation work is done. Also for assembly or wherever a holding fixture to do precision operations is needed. Uses Brown and Sharpe type screw machine collets and simplifies "setting-up" operations and in most instances eliminates the making of jigs or fixtures. Has low consumption of air and its simplicity of construction eliminates expensive repairs.

Four models — No. 00 — No. 0 — No. 2 and No. 2 Special. Collet capacity from 1/16 to 1¾".

Literature on request
Write for Catalog Sheet

REDMER AIR DEVICES CORP.
611 W. WASHINGTON BLVD., CHICAGO 6, ILL.

THE PASSING PARADE

T.M. REG. BY THE BRAMSON PUBLISHING COMPANY

THE EVER-CHANGING SCENE IN MASS MANUFACTURING

Well known in the aircraft, automotive and railroad industries, **Charles Gross** has been named Sales Manager of Murchey Machine & Tool Company. Gross comes to this pioneer in the machine threading field from Aeronautical Products, Incorporated.

With responsibility for engineering, manufacture and sales of all arc welding equipment and electrodes produced at the Trafford, Pennsylvania, Works of Westinghouse Electric and Manufacturing Company, **C. P. Croco** has been appointed manager of the newly formed Welding Department of the Division.

Croco, who served 18 years as an engineer with Westinghouse, left the company in early 1943 to become Director of Engineering for Federal Machine & Welder Company. He returned to Westinghouse recently to fill the newly created position.

Arthur S. Klopf has been appointed Manager of the Iron Division, Firegan Sales Company, Chicago. Klopf came to Firegan from Hansell-Elcook Company, Chicago, where he served as Foundry Manager.

New industrial manager of the St. Louis office, Brown Instrument Company, is **V. H. Hiermeier.** Coming from the Minneapolis-Honeywell Regulator Company Division's Chicago office, Hiermeir succeeds **I. K. Farley.**

Election of **R. W. Kerr** to the Board of Directors, the Plomb Tool Company, has been announced by **Morris B. Pendleton,** President. Kerr who assumes responsibility for sales, retains his position as Treasurer.

Floyd W. Eaton

R. W. Kerr

Floyd W. Eaton, for the past year Personnel Manager, Crawford Door Company, Detroit, was promoted to Plant Superintendent July 1. The company is now engaged in volume production of small precision aircraft engine parts. Eaton, well known for his work in war manpower training for the government, is National Treasurer of the American Society of Tool Engineers.

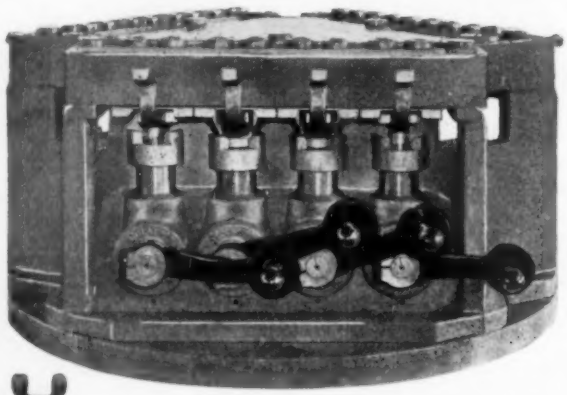
William K. Swigert, manufacturing advisor, has retired from the Propeller Division, Curtiss-Wright Corporation. Swigert was well known in the automobile industry before joining Curtiss-Wright 15 years ago.

Clarence L. Wanamaker has been appointed General Manager, Munitions Division, U. S. Rubber Company, Detroit.

In a move unparalleled in the history of the nation's armed forces, the War Department has officially confirmed the appointment of the famed auto builder, **Lt. Gen. William S. Knudsen,** as Director of the combined Army Air Forces Material and Services Command. The position is said to be the highest which a civilian-appointed Army officer has ever attained.

At the 20th annual meeting of the

(Continued on page 218)



THREE STATION INDEX FIXTURE FOR DRILLING HOLES IN UNIVERSAL JOINT YOKE. PARTS ARE CLAMPED AGAINST TOP PLATE IN ORDER TO CONTROL THE DEPTH OF MACHINED HOLES.

DESIGNERS

BUILDERS

ALL TYPES OF HOLDING FIXTURES FOR MACHINE SHOP PRODUCTION

MANUFACTURERS OF STANDARD SWARTZ DRILL JIGS AND FIXTURE LOCKS

WRITE FOR CATALOG 941

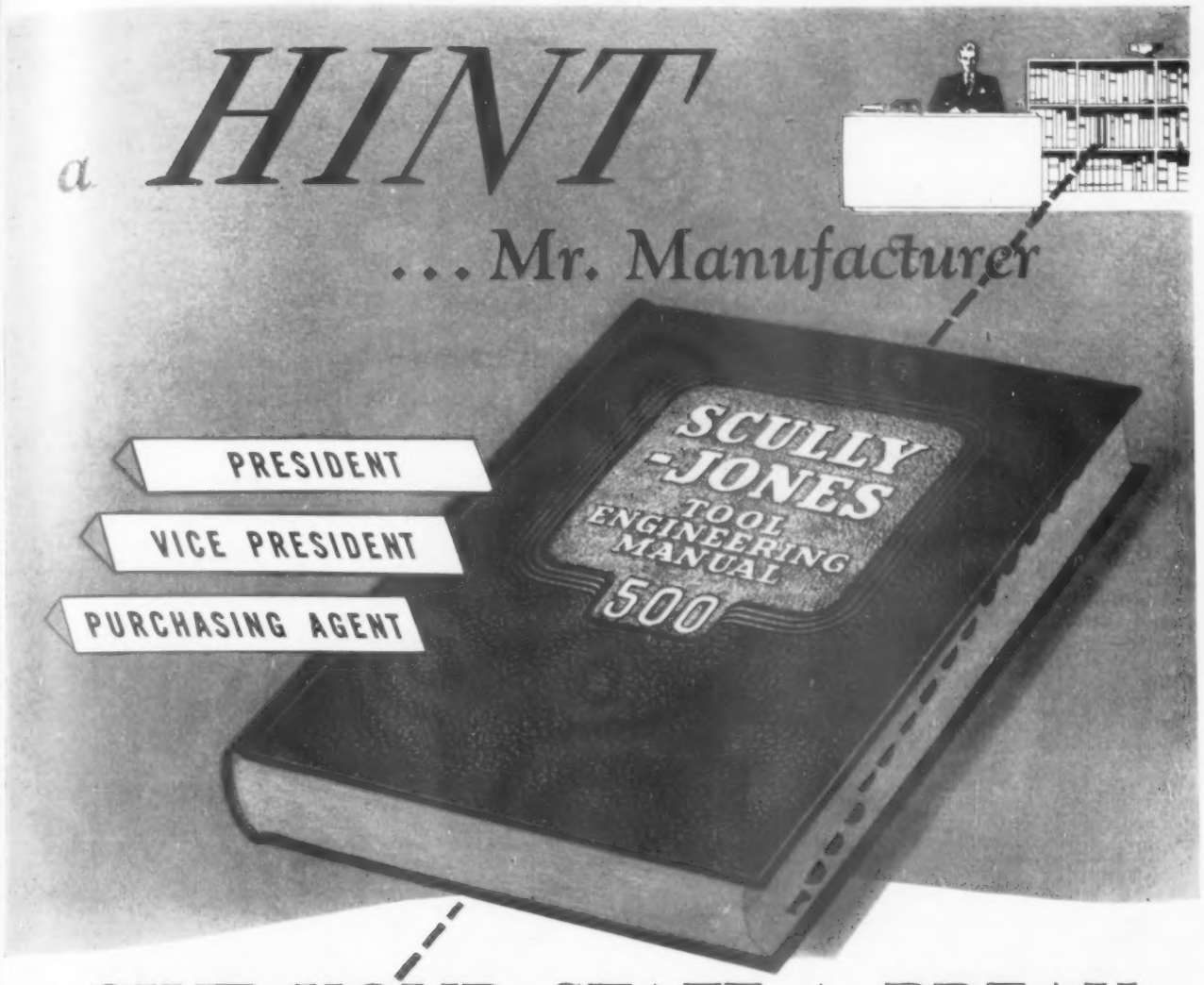
SWARTZ TOOL PRODUCTS CO., INC.

13330 Foley — Detroit, Michigan

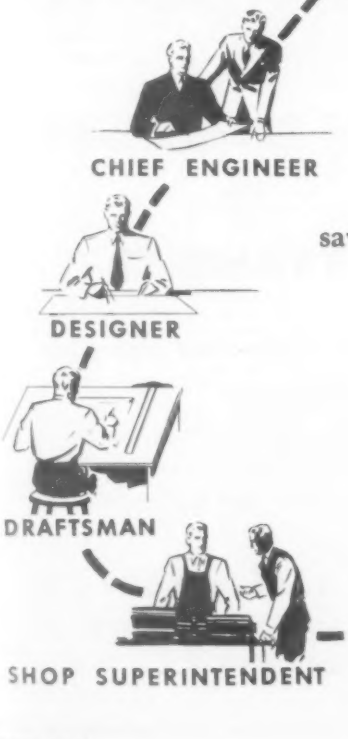
Represented by

Cleveland—J. W. Mull, Jr.
Indianapolis—J. W. Mull, Jr.
Milwaukee—Geo. M. Wolff, Inc.
Chicago—Ernie Johnson
Canada—Hi-Speed Tools, Ltd., Galt, Ont.
St. Louis—Mill Supply & Mach. Co.
Beverly Hills, Cal.—Production Tool Engineering
Houston—Engineering Sales Co.
Oneida, N. Y.—W. F. Himmelsbach
Pittsburgh—J. W. Mull, Jr.
Toledo—J. W. Mull, Jr.
Philadelphia, Pa.—Morgan Tool & Equipment Co.

a HINT ... Mr. Manufacturer



GIVE YOUR STAFF A BREAK



Your different department heads need the help you can give them by passing along *your* copy of the Scully-Jones Tool Engineering Manual 500. The tooling data and information in this book will save them long hours of searching. Requests from the men in the shop plus the paper shortage has made it impossible for us to supply your entire staff with books, so we ask for your help. Pass your copy on to the shop, notify us and we'll replace it when victory is won.

Scully-Jones AND COMPANY
1901 SOUTH ROCKWELL STREET • CHICAGO, U. S. A.

Radio Manufacturers Association, **Frederick R. Lack**, Vice President and Manager of the Radio Division, Western Electric Company, was elected a director for a term of two years. Lack recently served as Director of the Army-Navy Electronics Production Agency, Washington.

Election of **Howard P. DeVilbiss** as President and General Manager, and of Allen D. Gutchess as Chairman of the Board and Active Senior Executive of the DeVilbiss Company has been announced by the Toledo concern.

The new president served previously as Vice President. Gutchess has been president of the firm since 1929. As Board Chairman, he succeeds **W. M. Booker**, who will continue as a member of the board.

Coincident with these changes, **Frank A. Bailey**, Vice President and General Manager, with the company for 34 years, is retiring because of poor health. **Roy A. Guyer** continues as Vice President in charge of sales and becomes a director, while **Don J. Peeps**, of the engineering staff, becomes Acting Chief Engineer.

News for production men familiar with the early, trying days at Ford's Willow Run, is the appointment of **Thomas Barber** as manager of its Chicago office and partner in the Michigan Designing and Engineering Company.

Barber is well known in the automotive and aircraft industries for his work on the first two B-24 bombers to move off the new famous 'plane an hour' assembly line at Willow Run. After leaving the Ford Motor Company, Barber served as Chief Tool Engineer of the Dodge Chicago Engine Plant.

Appointment of **Roy H. Jones** as direct representative in the Los Angeles area has been announced by the Barber-Colman Company. A Barber-Colman employee for 27 years, Jones will handle hobs, milling cutters and reamers in the Western territory.

M. T. Berry

Roy H. Jones

New Service Engineer for the Firth-Sterling Steel Company in 22 up-state New York counties is **M. T. Berry**, Syracuse. Berry moved to Firth-Sterling from Brown, Lipe Chapin Company.

Appointment of **W. G. Lewellen** as assistant to **E. F. Johnson**, Vice President of General Motors in charge of the Eastern Aircraft Division and of the Dayton Division, has been announced by **C. E. Wilson**, the Corporation President. Lewellen entered the GM organization through the engineering department of the Chevrolet Division, New York, in 1919.

Phillips Mine and Mill Supply Company, Pittsburgh, has appointed **P. T. Keebler** as Plant Manager of the company's Industrial Car Division. Keebler replaces **R. R. Phillips**, recently commissioned a Lieutenant (J.G.) in the Navy.

The Chicago Latrobe Twist Drill Works has announced that **A. R. Toepfer**, long in the mill supply field, has joined its organization as District Representative in Wisconsin and Minnesota. Toepfer will make his headquarters in Minnesota.

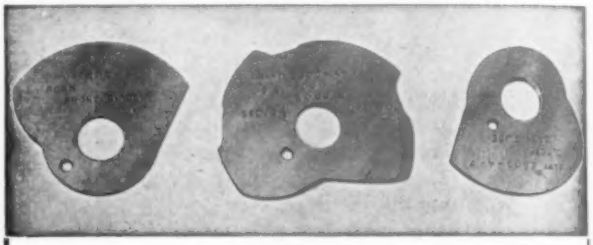
Sales and service activities of Baldwin-Westinghouse Diesel locomotives now are under the supervision of **C. G. Green**, Assistant to the Divisional Vice President, Locomotive and Ordnance Division of The Baldwin Locomotive Works. **J. G. Broz**, Sales Manager, Diesel Engine Section, Locomotive and Ordnance Division, will direct sales of Diesel engines and electric locomotives.

Harold T. Youngren, for 11 years Chief Engineer of the General Motors Oldsmobile Division, has gone to Borg-Warner Corporation as Director of Engineering Development. Supervision of

(Continued on page 220)

Universal Floating Chucks drill, counter-bore, ream or pilot from a lead hole. Adjustable pressure compensates for tool weight, allows increased feed without causing marred holes. For horizontal operation in screw machines and turret lathes. Write today for further facts about Universal Floating Chucks, Collet Chucks and Drill Bushings.

UNIVERSAL ENGINEERING CO.
FRANKENMUTH, MICHIGAN



SCREW MACHINE CAMS
for
B & S MACHINES

Cams cut to your layout shipped within 2 to 3 days.

Set of 3 No. 00 Cams including blanks, cutting, heat treating — $6.20 complete. Other sizes in proportion.

GEORGE L. DETTERBECK CO.
1871 CLYBOURN AVENUE
CHICAGO, ILL.

LIPE

Carbo

...Especially for the Multiple-Part Runs of Postwar Productions...

the **LIPE CARBO...a** semi-automatic lathe, designed and built for the Carbide Age...

When production settles down to a peacetime level... when multiple cuts on multiple-part runs are the regular thing... that's when you'll really appreciate the low-cost production of the Lipe Carbo-Lathe. Designed especially for the Carbide Age, it has the tooling, the torque, smoothness and freedom from torsional deflections that enable heavier compound cuts at the higher surface speeds recommended for carbide tools.

Extreme rigidity, plus the smoothness of worm-gear drive, and 162 speed changes insure long tool wear, longer runs between re-grinds and low tool breakage on castings, forgings, plastics, welded parts or intermittent cuts. Works to tolerances that would have been considered "tight" for toolroom lathes before the war. Cuts range from 0.003" to 0.030". Swing over bed 12", between centers 18". Let us send you complete data and delivery dates.

ARMY E NAVY

LIPE-ROLLWAY CORP.
SYRACUSE 1, N. Y.

LATHE

Borg-Warner research laboratories and co-operation with plant engineers of the corporation's 20 divisions and subsidiaries will be among his duties.

Youngren has been succeeded at Oldsmobile by **J. F. Wolfram,** who has been associated with the G. M. Division for 16 years.

Formerly with the Timken Roller Bearing Company, **George M. Lange** has joined the Fuel Injection Division of the Ex-Cell-O Corporation, Detroit. For the past two years he has served as a consulting engineer in the Office of the Deputy Vice-Chairman for Production, War Production Board, Washington.

R. E. Henderson

George M. Lange

The appointment of **R. E. Henderson** as Eastern Sales Representative has been announced by The Wickman Corporation, Detroit. He assumes responsibility for sales and engineering in the New York and New England territories, with offices in Newark, New Jersey.

Before joining Wickman, Henderson served in production executive capacities with General Electric, Wright Aeronautical, International Motor, and Northeast Electric Companies.

S. E. Hackett, formerly president of Jones & Laughlin Steel Corporation, has joined Porter-Blairsville Company, a division of H. K. Porter Company, Incorporated, Pittsburgh, as Vice President in charge of production. Hackett was associated with the steel corporation for 20 years until he retired in 1938.

New Field Engineer in the Chicago district for Eutectic Welding Alloys Company is **Dudley Rice.** Previously, he was associated with the American Brake Shoe Company and the Maintenance of Way, Welding Department of the Erie Railroad Company.

Charles A. Powell, Manager, Headquarters Engineering, Westinghouse Electric and Manufacturing Company, has been elected President of the American Institute of Electrical Engineers. Powell succeeds **Dr. Nevin E. Funk,** Vice President, Philadelphia Electric Company, as the Society's top officer.

Appointment of **James R. Longwell** as Director of Engineering and Research, Carboloy, Incorporated, has been announced by **W. G. Robbins,** President. During 15 years with the concern, Longwell has served successively as Development Engineer, Chief Engineer and Factory Manager. He will direct engineering and research work on new products and processes involving the company's carbide tools.

J. R. Longwell

S. J. Kornhauser

Election of **Samuel J. Kornhauser** as President, National Tool Company, to succeed the late **Arthur J. Brandt,** has been announced. He has been Executive Vice-President for three years. Previously, for 25 years, he served in various executive capacities of the company, one of the largest manufacturers of custom-made, high precision cutting tools in the United States.

Well known for his work on the company's Machine Tool Forums, Donald **W. McGill** has been appointed Manager, Machinery Electrification Section, Industrial Department, Westinghouse.

(Concluded on page 222)

THE UTILITY SLEEVE
Removable Taper Shank
TOOL DRIVER

CUTS SMALL TOOL COSTS

SIMPLE, POWERFUL, POSITIVE, ACCURATE.

For:
TAPS
DRILLS
REAMERS
END MILLS
COUNTERSINKS
CENTER DRILLS
COUNTERBORES
WOODRUFF CUTTERS
TAPER PIN REAMERS, ETC.

THE J. C. GLENZER COMPANY
DETROIT, 10 - - - - MICHIGAN

CENTER REAMERS
HIGH SPEED
45, 60, 82 and 90 DEGREES
IMMEDIATE DELIVERY

SIZE	LGTH OVERAL	SHANK DIA	LGTH SHANK	OUR NET PRICE
1/4	19/16	3/16	3/4	$ .80
3/8	2	1/4	7/8	.92
1/2	2 1/16	3/8	7/8	1.13
5/8	2 5/16	3/8	7/8	1.40
3/4	2 3/4	1/2	1 1/4	1.75
1	3	1/2	1 1/2	3.50

Victor Machinery Exchange, Inc.
251 Centre Street • New York, N. Y.
Phone: CAnal 6-5575
SEND FOR OUR CIRCULARS

GORTON

SPECIALISTS FOR OVER 50 YEARS IN

Tracer-Controlled MILLING

Automatic *Rotation PROFILING

* WORK and MASTER **ROTATE** with TABLE MOVEMENT

CYLINDRICAL Interrupter Cam for Gun-Fire Control

A Typical HIGH PRODUCTION Profiling Job—done on the Gorton 9-J Duplicator. 10 elliptical wells—no two the same size—on each of these cylindrical work pieces are rough and finish milled, with beveled edges—simply by combination of Tracer Control, with Automatic Rotation of work and master, geared to table movement—all controlled by one central lever motion.

Blank cylinders come to the Gorton Duplicator, finish-turned. The 10 wells are first rough milled to a depth of .052". Then a finish cut, with the same cutter and spindle speed, removes .010" stock, merely by lowering spindle the required amount. Hand finishing required is almost negligible—due to the excellent finish obtained by the use of 2-flute Tungsten Carbide form cutters—at Gorton high spindle speeds.

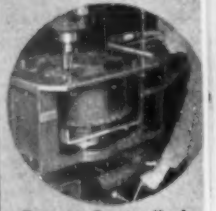
PRODUCTION DATA

Material—S.A.E. 1020 Seamless Steel Tubing.
Operation—Rough and Finish Milling of 10 Wells (varying from 3/4" wide x 3/8" long . . . to 3 5/8" wide x 2" long), .062" deep.
Cylinders—9 9/16" O.D. x 7 25/32" long.
Feed—Manual . . . Spindle Speed—4,000 r.p.m.
Tolerances—±.005".
Time—Roughing 18 minutes; finishing 23 minutes; total floor-to-floor, 43 minutes. (10 wells complete, average 4.3 min. per well.)

ENGINEERING SERVICE . . . FREE

Have the advantage of 50 years of Gorton Specialized Tracer Control Experience in your shop—call nearest Gorton dealer or write to Gorton factory at Racine, Wisconsin.

The *Right* Size The *Right* Type of Machine for Every Job . . .
From 2 oz. to 2 ton DIE BLOCKS



Tracer-Controlled MILLING

Tracer-Controlled DUPLICATING

Tracer-Controlled ENGRAVING

Tracer-Controlled ETCHING

GORTON *Precision* MACHINES

CUTTER GRINDERS
ETCHING MACHINES
2 & 3 Dimensional PANTOGRAPHS
Vertical & Universal Head Super-Speed MILLERS
Manual & Electric Control DUPLICATORS

TEAR OFF COUPON AND MAIL TODAY

George Gorton Machine Co.,
1108-13 Racine St., Racine, Wis.
Send me these free books

- ☐ Condensed Catalog
- ☐ Die and Mold Duplicators

Name ..... Title .....
Company .....
Address .....
City ..... State .....

BARNES "600" HACK SAW BLADES

When you want to cut tubing . . . sheet steel . . . pipe . . . conduit . . . or other thin section material by hand, you will get best results with Barnes "600" Blades. They are made *specifically* for this type of work . . . and can be depended upon to *really* "cut" without possibility of stripping teeth or breaking in use.

Barnes "600" Blades are only one of a number of types of blades manufactured by the W. O. Barnes Company to meet every conceivable production sawing need. For the hack saw blades or band saws best suited to your purpose, see your Barnes Distributor. He carries the complete line in stock.

W. O. BARNES CO., INC. 1919 - 1944
DETROIT 14, MICHIGAN ○ TWENTY-FIFTH ANNIVERSARY ○

PASSING PARADE

(Concluded from page 220)

Deaths

Edward J. Charron, President, Charron Engineering Sales, Detroit, died in the Motor Capital July 18. Well known and respected in the machine tool business, he served as a manufacturers agent for 22 years. He was 54 years old.

Daniel C. Green, Chairman of the Board and Chief Executive Officer, Cleveland Pneumatic Tool Company, died July 2.

Ira D. LeFevere, Comptroller of the General Electric Company since 1935, died June 4. Mr. LeFevere, who joined GE in 1903, founded the GE business training course.

George C. Purdy, Chairman of the Board, Greenlee Brothers & Company, died July 2. He was 73 years old. Mr. Purdy completed his 50th year with the machine tool builder in 1943.

Harvey B. Bower, Vice President, Chicago-Latrobe Twist Drill Works, died recently. He joined the company in 1937.

Albert Haberer, 42, Assistant Chief Engineer, Fisher Body Division, General Motors Corporation, died recently. Mr. Haberer had been associated with Fisher for 27 years.

BLADE MACHINING

(Concluded from page 204)

tilted from side to side so that the blade can be ground at desired angles. Butt ends of the blade are held snug on a tapered arbor against a plate which is part of the cradle.

A hydraulic cylinder actuates the lengthwise movement of the table, which usually feeds at about ten feet per minute.

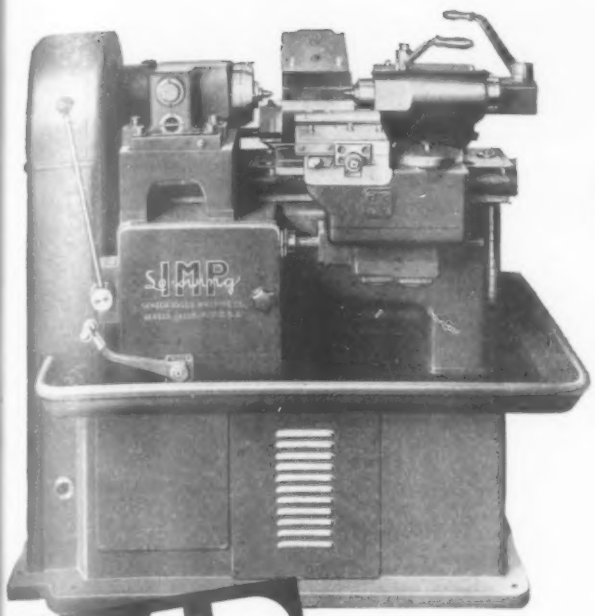
Movement of the cradle is by means of guide rolls, linked with the drum, which run along steel tracks on the sides of the cradle. Pitch of the cradle is thereby actuated so that the blade surfaces are kept parallel to the forming drum and ground at the proper angle.

The forming drum is suspended above the blade, separated from contact with it only by the strop or continuous belt. The drum, which may also be considered as a rotating cam, is synchronized to the table by a rack on the table and a pinion on the cam. The drum may be raised or lowered so that the depth of the grind made by the strop is regulated to .0001".

Equally interesting is the fact that the machine can cut its own forming drums reversing the surfaces of the abrasive belt and using a master blade as a model.

Simplicity of design is attested by the fact that only one graduated dial, an ammeter, is required to indicate the functioning of the machine. Each complete revolution of the feed control hand wheel compensates for .030" of stock removal from the blade forging.

THE END



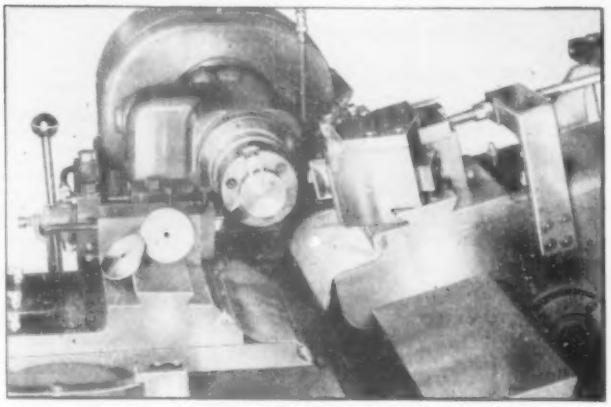
A *Versatile* AUTOMATIC LATHE

FOR SMALL WORK DEMANDING HIGH SPEEDS AND EXTREME ACCURACY

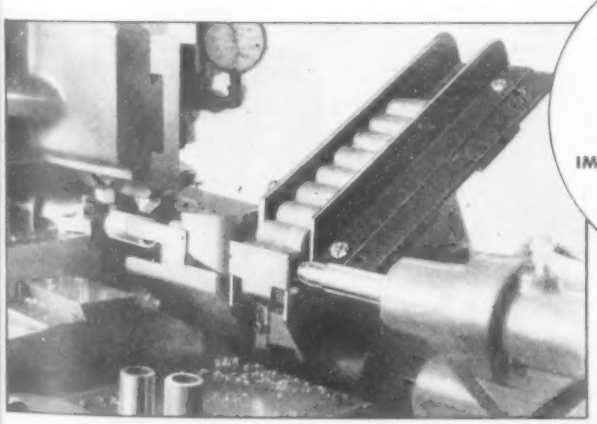
The Lo-swing IMP Lathe lends itself to practically unlimited tooling possibilities. Illustration above shows a standard machine. The close-up views show three typical applications of standard and special attachments to the base machine which have resulted in increased production and lowered costs.

If you have a turning job requiring high speeds, fine finishes and extreme accuracy, write for IMP Bulletin N-42.

SENECA FALLS MACHINE CO.
Seneca Falls, N. Y.

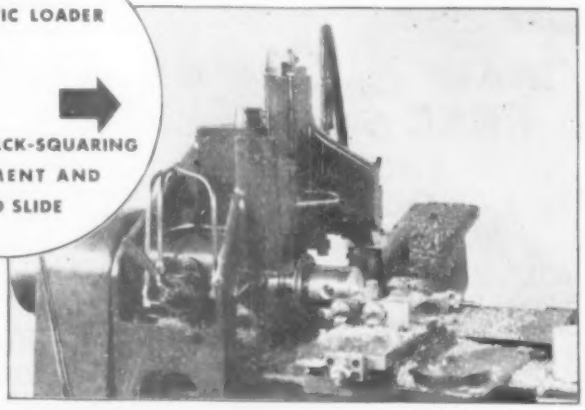


IMP WITH BACK-SQUARING ATTACHMENT



IMP WITH AUTOMATIC LOADER

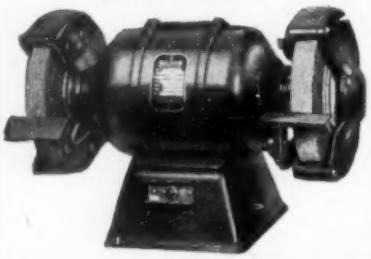
IMP WITH BACK-SQUARING ATTACHMENT AND THIRD SLIDE



LATHE NEWS *from* SENECA FALLS

BALDOR
BALL BEARING **GRINDERS**

HEAVY DUTY



BUILT FOR HEAVY PRODUCTION SERVICE

BALDOR Grinder No. 101—built for the heavier production jobs. 1½ hp., ball-bearing motor; 1725 r.p.m., 220, 3-phase, 60-cycle. 10" x 1" Aloxite wheels, exhaust type guards and adjustable tool rests. **$90.00**

***Ask for* Bulletin 319**

Baldor Electric Company

4335 Duncan Ave., St. Louis 10, Mo.

BUILT BY MOTOR SPECIALISTS

ATTENTION!

Send for
FREE Sample
TAMMS LAYOUT DOPE
in Blue, Black, Orange and Red

Speeds layout time on brass, aluminum, copper, tin, stainless steel. Oil Resistant. Won't chip, crack or flake off. Also ideal as a marking dye for easy identification of metals. Comes in handy 8 oz. bench type brush-in cans. Also pts., qts., gals.

TAMMS SILICA CO.
228-T No. LaSalle St.
CHICAGO 1, ILL.

CLASSIFIED ADVERTISING

The Tool Engineer
THE BRAMSON PUBLISHING COMPANY
2842 W. Grand Blvd. Detroit 2, Mich.

SITUATIONS AVAILABLE

HIGH GRADE AGENTS WANTED

We are looking for strictly first class representation by men with a proved record of performance and acceptance in their territories. Our present products include plug, ring and instrument gages, ground thread taps, various other perishable tools and machine tool accessories. We have a definite postwar product and merchandising program.

All field efforts are supported by national advertising, direct mail campaigns and product catalogs.

We prefer men with one or two related non-competitive lines and who are capable of both sales and service.

If interested, write: Ralph Kramer, Sales Manager, N. A. Woodworth Company, 1300 E. Nine Mile Road, Detroit 20, Michigan.

* * *

TOOL ENGINEER: Company with long established record for successful and profitable operations requires senior tool engineer to design tools for group of plants. Heavy machine work, forgings, sheet metal, and foundry work. Products include engines, compressors, pumps, heating and air-conditioning equipment. Favorable experience would include actual tool making and tool designing. Plants located in Pennsylvania. Pleasant community to live in. Sound postwar career. Salary attractive. Reply giving full details of personal history, experience and accomplishments. Box 831, THE TOOL ENGINEER.

* * *

Manufacturer's representative wanted by a mid-western manufacturer of metal stampings in small lots. Some very desirable territory still open on a protected commission basis. Die stamping knowledge an advantage. Reply Room 209, Washington Boulevard, Chicago, Illinois.

SITUATIONS WANTED

Registered mechanical engineer, age 42, experience in machine design, shop practice and supervisor of tool design wants position. Is postwar planning. Preferably with manufacturer in Detroit area. Box 830, THE TOOL ENGINEER.

* * *

Tool engineer desires position with company doing war work. Has had experience in the manufacture of shells and cartridge cases. Also 19 years experience in the steel industry. Prefer Middle West. Box 827, THE TOOL ENGINEER.

* * *

Permanent position wanted as factory superintendent or tool or process engineer in medium sized plant. Prefer Detroit area. Twenty years experience. M.E. degree. Age 40. Box 826, THE TOOL ENGINEER.

NEW PRODUCTS WANTED

POSTWAR PRODUCT TO MANUFACTURE WANTED

Leading organization of several hundred skilled designers, engineers, toolmakers and complete modern plant seeks postwar product or machinery. Will develop, and manufacture. If desired, we will include advertising and sales. Royalty basis or any other satisfactory arrangement. Box 829, THE TOOL ENGINEER.

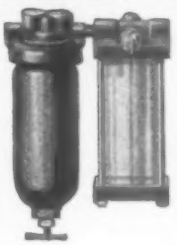
MACHINERY WANTED

WANTED STANDARD AUTOMATIC DROPS

Two hundred, four hundred, and eight hundred pounds. Also board drops up to one thousand pounds. Box 828, THE TOOL ENGINEER.

M·B AIR-LINE FILTER *and* AUTOMATIC LUBRICATOR

Removes 96% to 97% of All Water, Dirt and Scale from Airline.



PROLONGS THE LIFE OF COSTLY BEARINGS

in the case of pneumatic tools and other items due to insufficient lubrication.

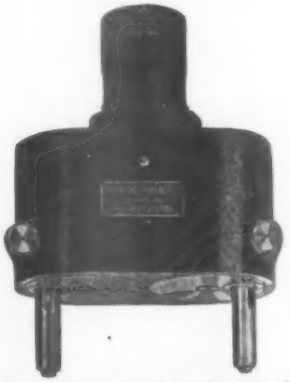
AIR passes through a series of brass discs with .002 spacings, providing the finest degree of filtration obtainable. Then as the air passes through head of Lubricator, oil is delivered into the purified airline in any desired volume. The scarcity of replacement parts makes the use of these devices doubly important.

A combination of this kind is only as efficient as the filter unit of the assembly.

Write for Literature

M·B PRODUCTS
130-134 E. Larned St.
Detroit 26, Michigan

U S HEADS
STANDARD SINCE 1915

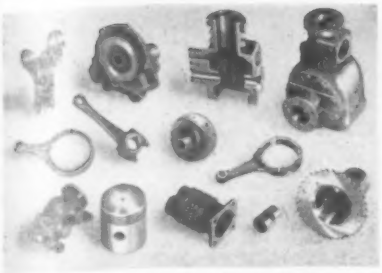


56 DIFFERENT STANDARD SIZE ADJUSTABLE DRILL HEADS, CAPACITIES UP TO 1½" DRILLS

SEND US YOUR B/PS

All Types of Fixed Center Heads

UNITED STATES DRILL HEAD CO.
Cincinnati, Ohio



What's the best way to make holes?

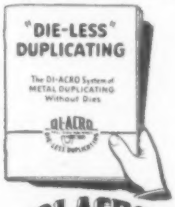
An answer to that question can be found here where an organization of many years' specialized experience is ready to help you in manufacturing engineering, in equipment designing and building, and in setting up operations for making and finishing holes.

Send parts drawings for our recommendations.

HOLE ENGINEERING SERVICE
13722 LINWOOD AVENUE
DETROIT 6, MICHIGAN

METAL Stampings DUPLICATED WITHOUT DIES

If you desire to save time and critical materials on production of metal stampings or other small parts, then the DI-ACRO System of "Metal Duplicating Without Dies" merits your consideration. It is based on the rapid and accurate production of formed parts with DI-ACRO Shears, Brakes and Benders. All duplicated work is accurate to .001". These precision machines are adaptable to an endless variety of work, and ideally suited for use by girl operators. For short runs your parts are processed in a matter of hours instead of waiting weeks for dies.



Send for this Catalog
"DIE-LESS DUPLICATING"

It illustrates many stampings or parts made without dies, gives full details on DI-ACRO machines and shows how they may readily be adapted for various applications. Request your copy now.

DI-ACRO PRECISION MACHINES DIE-LESS DUPLICATING

Pronounced "DIE-ACK-RO"

O'NEIL-IRWIN MFG. CO.
307 Eighth Ave. So.
Minneapolis 15, Minn.

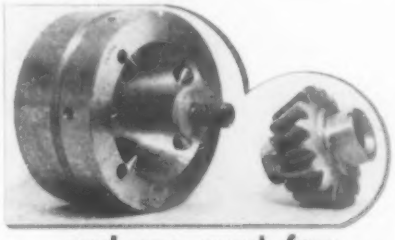
We are equipped to do what you cannot afford to do for yourself, and can still less afford to leave undone.

NATIONAL TOOL SALVAGE CO.
6511 Epworth Blvd.
Detroit 10, Mich.

GARRISON GEAR CHUCKS

are used on:

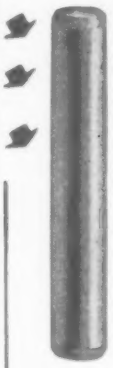
Gear Shapers . . . Drill Presses . . . Engine Lathes . . . Turret Lathes . . . Internal Grinders . . . External Grinders . . . Gear Tooth Grinders . . . Oscillating Grinders . . . Diamond Boring Machines . . . Horizontal Boring Machines.



and are used for:

Grinding, Machining, Precision Boring and other operations on Spur, Internal, Bevel, Cluster, Helical and Herringbone Gears.

GARRISON MACHINE WORKS, Inc.
DAYTON 7, OHIO



DANLY *Precision* DOWEL PINS

All Die Makers' Supplies

Danly Precision Dowel Pins

Danly Commercial Sets

Danly Special Sets

DANLY MACHINE SPECIALTIES, INC.
2100 S. 52nd Avenue, Chicago, Ill.
MILWAUKEE • LONG ISLAND CITY, N. Y.
DAYTON • DETROIT • ROCHESTER
CLEVELAND • PHILADELPHIA
Ducommun Metals & Supply Co.
Los Angeles • San Francisco

DANLY PRECISION DIE SETS

GAGES DECIDE VITAL ISSUES IN TODAY'S PRODUCTION

MAKE *Doubly* SURE

WITH **DUBLIFE** *REVERSIBLE* **PLUG GAGES**

Armored for precision by UPPCO-Lapped finish

Both "Go" and "No Go" plugs, ***each reversible,*** same balanced hexagon handle.

Tolerances to .00002"

Save critical materials by using DUBLIFE

When either plug shows slightest wear, simply turn it end for end ***in moments — without leaving job*** —and you have a brand new gage, with national reputation for dependability.

Send for complete Catalog. Other gages of A.G. design.

UNITED PRECISION PRODUCTS CO.
3517 WEST BELMONT AVE.
CHICAGO 18, ILLINOIS

Advertisers Appearing In This Issue

Acme Industrial Co. 206
Adamant Tool Co. 207
Advanced Tool Design Co. 183
Ajax Steel & Forge Co. 209
Alco Tool Co., The 152
Allegheny Ludlum Steel Corp. 141
Am. Cutter & Engineering Corp. 208
Ames Co., B. C. 168
Ampco Metal, Inc. 183, 213
Archer & Smith, Ltd. 25
Armstrong-Blum Mfg. Co. 193
Armstrong Bros. Tool Co. 158
Aro Equipment Corp., The 143
Arter Grinding Machine Co. 190
Axelson Mfg. Co. 209

Baker Bros., Inc. 153
Baldor Electric Co. 224
Barber-Colman Co. 23
Barnes Drill Co. 40
Barnes Co., W. F. & John 129
Barnes Co., Inc., W. O. 222
Bartelt Engineering Co. 185
Behr-Manning Corp. 13
Besly & Co., Charles H. 177
Black Drill Co. 178
Blake Co., Edward 204
Bliss & Laughlin, Inc. 172
Boyar-Schultz Corp. 192
Bradford Machine Tool Co., The 209
Brown & Sharpe Mfg. Co. 199
Bryant Chucking Grinder Co. 8

Campbell Div., Andrew C., Am. Chain & Cable Co., Inc. 185
Carbide Tool Co. 7
Carboloy Co., Inc. 113
Carborundum Co., The 29
Carlton Machine Tool Co., The 184
Carpenter Steel Co., The 56
Cerro de Pasco Copper Corp. 210
Chicago Rawhide Mfg. Co. 206
Chicago Rivet & Machine Co. 212
Chicago Wheel & Mfg. Co. 27
Cincinnati Milling Machine Co., The 114
Cincinnati Planer Co., The 140
Cincinnati Shaper Co., The 125
Circular Tool Co., Inc. 150
Cleveland Automatic Machine Co., The 110
Cleveland Twist Drill Co., The 135
Climax Molybdenum Co. 34
Colonial Broach Co. 167
Columbia Tool Steel Co. 198
Colwell, S. G. 211
Cone Automatic Machine Co., Inc. 38
Continental Machines, Inc. 147
Cooper-Bessemer Corp., The 165
Cortland Grinding Wheels Co. 24
Coulter Machine Co., The James 213
Cullen-Friestedt Co. 215
Cunningham Co., M. E. 208
Cushman Chuck Co., The 4

Dalzen Tool & Mfg. Co. 20
Danly Machine Specialties, Inc. 225
Davis Boring Tool Div. 155
Detroit Broach Co. 137
Detroit Die Set Corp. 156
Detroit Tap & Tool Co. 12
Detterbeck Co., George L. 218
Deutsch Co., The 108
DeWalt Products Corp. 136
Dumore Co., The 151
Dykem Co., The 208

Eastern Cutter Corp. 148
Eclipse Counterbore Co. 203
Etteo Tool Co. 160
Ex-Cell-O Corp. 19

Federal Products Corp. 42
Federal Tool Corp. 210
Firth-Sterling Steel Co. 61
Fitchburg Grinding Machine Corp. 10
Ford Motor Co., Johansson Gage Div. 191

Galland-Henning Mfg. Co. 150
Gallmeyer & Livingston Co. 213
Gammons-Hoaglund Co., The 214
Gardner Machine Co. 58
Garrison Machine Works, Inc. 225
General Engineering & Mfg. Co. 184
Giddings & Lewis Machine Tool Co. 32
Giern & Anholtt Tool Co. 215
Gisholt Machine Co. 50, 142
Glenzer Co., The J. C. 220
Gorton Machine Co., George 221
Gray-Mills Co. 136
Grayson Mfg. Co. 144
Greenfield Tap & Die Corp. 66
Gulf Oil Corp. 9

Haines Gauge Co. 188
Hammond Machinery Builders, Inc. 206
Hanchett Mfg. Co. 16
Handy & Harman 119
Hanna Engineering Works 214
Hanniffin Mfg. Co. 64
Hardinge Bros., Inc. ..... Front Cover
Hartford Chrome Corp. 187
Hartford Spec. Machinery Co., The 208
Haskins Co., R. G. 210
Haynes Stellite Co. 41
Heald Machine Co., The 35
Hobart Bros. Co. 213
Hole Engineering Service 225
Holliday & Co., W. J. 157
Holo-Krome Screw Corp., The 2
Hunt & Son, C. B. 174

International Nickel Co., Inc., The 45

Jarvis Co., The Charles L. 11
Jones & Lamson Machine Co. 15

Kearney & Trecker Prod. Corp. 5
Kennametal, Inc. 120
Kent-Owens Machine Co. 195
Koebel Diamond Tool Co. 208

Lake Shore Tool Wks., Inc. 7
Landis Machine Co. 227
Landis Tool Co. 161
LaPointe Machine Tool Co., The 63
Latrobe Electric Steel Co. 48
Leach Machinery Co., H. 18
LeBlond Machine Tool Co., R. K., The ..... 4th Cover
Lehmann Machine Company 182
LeMaire Tool & Mfg. Co. 14
Lempco Products Co. 22
Lewthwaite Machine Co., T. H. 183
Lincoln Park Industries, Inc. 228
Lipe-Rollway Corp. 219
Lodge & Shipley Machine Tool Co., The 217
Logan Engineering Co. 36
Logansport Machine Co., Inc. 180, 184, 206
Lovejoy Tool Co., Inc. 201

McCrosky Tool Corp. 122
Machine Products Corp. 202
Macklin Co. 53
Majestic Tool & Mfg. Co. 190
Master Chrome Service, Inc. 148
Matthews & Co., Jas H. 176
M-B Products 224
Mead Specialties Co. 214
Metal Carbides Corp. 192
Micromatic Hone Corp. 51
Moline Tool Co. 211
Monarch Steel Co. 126
Moore Special Tool Co., Inc. 53
Motor Products Corp., Deepfreeze Div. 6

National Acme Co., The 96
National Broach & Machine Co. 54
National Tool Co. 148
National Tool Salvage Co. 225
National Twist Drill & Tool Co. 43
New England Carbide Tool Co., Inc. 175
Newfield Machined Parts Co. 210
Nielsen, Inc. 182
Norton Co. 138

Ohio Crankshaft Co., The 131
Oilgear Co., The 123
O K Tool Co., The 194
O'Neil-Irwin Mfg. Co. 223
Oster Mfg. Co., The 46
Ott Machinery Sales, Inc. 213

Physicists Research Co. 128
Pioneer Pump & Mfg. Co. 111
Pipe Machinery Co., The 44
Plan-O-Mill Corp. 36
Porter-Cable Machine Co. 133
Potter & Johnston Machine Co., The 149
Pratt & Whitney Division ..... 2nd Cover
Producto Machine Co., The 211
Putnam Tool Co. 186

Quality Tool & Die Co. 127

Ransome Machinery Co. 207
Ready Tool Co., The 191
Redmer Air Devices Corp. 213
Reliance Electric & Eng. Co. 17
Republic Gage Co. 154
Rivett Lathe & Grinder, Inc. ..... 3rd Cover
Roberts Rubber Co., Weldon 209
Rockford Magnetic Products Co. 212
Ruthman Machinery Co., The 176

Safety Grinding Wheel & Mach. Co., The 39
Schauer Machine Co. 184
Scherr Co., Inc., Geo. 212
Scientific Div. of Acme Industrial Co. 212
Scully-Jones & Co. 217
Seneca Falls Machine Co. 223
Severance Tool Industries, Inc. 39
Sheffield Corp., The 105
Shell Oil Co., Inc. 55
Sidney Machine Tool Co., The 57
Simonds Saw & Steel Co. 152
Simmons Machine Tool Corp. 181
Skilsaw, Inc. 179
Smit & Sons, J. K. 180
Snyder Tool & Engineering Co. 26
Sonney-Vacuum Oil Co., Inc. 62
South Bend Lathe Works 189
Standard Gage Co., Inc. 1
Standard Oil Co. (Indiana) 49
Starrett Co., The L. S. 188
Stokerunit Corp. 171
Stuart Oil Co., Ltd., D. A. 182
Sturdimatic Tool Co. 214
Sturtevant Co., P. A. 207
Sundstrand Machine Tool Co. 197
Sunnen Products Co. 12
Super Tool Co. 133
Swartz Tool Products Co., Inc. 219

Taft-Peirce Mfg. Co., The 143
Tamms Silica Co. 224
Tannewitz Works, The 180
Tungsten Electric Corp. 169
Turner Machinery Co. 31
Tuthill Pump Co. 140

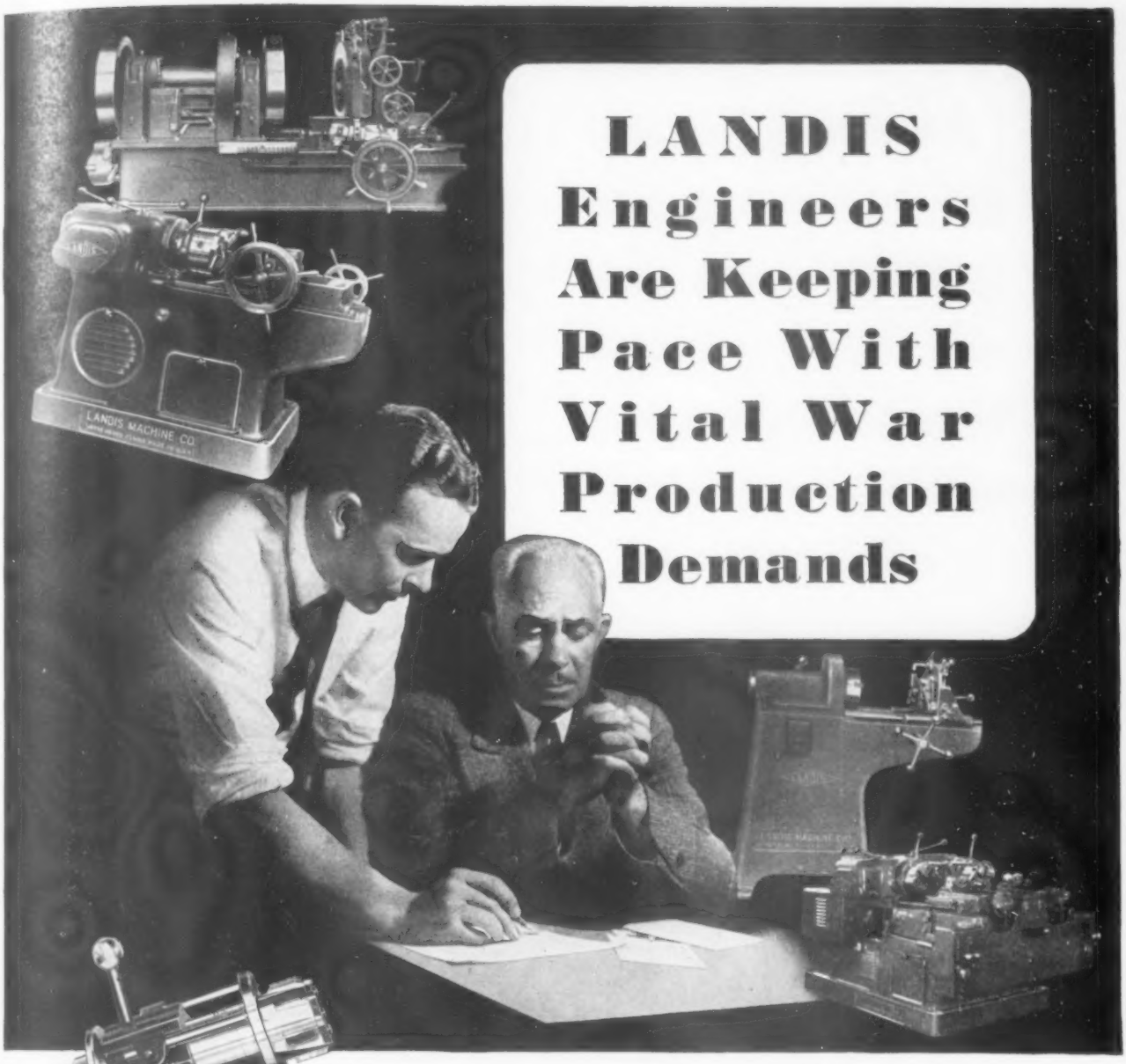
Union Carbide and Carbon Corp. 61
United Precision Prod. Co. 226
United States Drill Head Co. 224
U. S. Machine Tool Mfg. Corp. 202
Universal Engineering Co. 99, 218
Universal Wheel & Abrasive 47

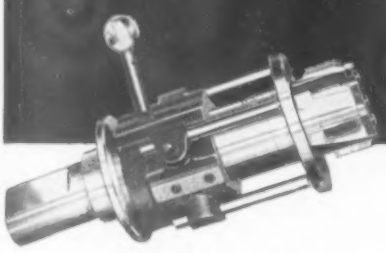
Van Norman Co. 28
Vascoloy-Ramet Corp. 62
Vickers, Inc. 37
Victor Machinery Exchange, Inc. 220
Vinco Corp. 60
Vulcan Tool Co., The 2

Wales-Strippit Corp. 200
Warner & Swasey Co. 33
Welding Equipment & Supply Co. 64
Weldon Tool Co., The 130
Wells Mfg. Corp. 118
Westinghouse Elec. & Mfg. Co. 139
Wheel Trueing Tool Co. 171
Wickman Corp., The 124
Willey's Carbide Tool Co. 164
Wilson Mechanical Instrument Co., Inc. 198
Winter Brothers Co. 21
Woodworth Co., N. A. 139
Wrigley Jr. Co., Wm. 199

Ziegler Tool Co., W. M. 179

LANDIS Engineers Are Keeping Pace With Vital War Production Demands





LANDIS Style LT Collapsible Tap

The LANCO Head

More Production—Greater Accuracy is uppermost in the minds of LANDIS Engineers as they methodically streamline the LANDIS LINE—gearing it to the war effort.

Odd machine sizes are eliminated, old type Heads discontinued—New Machines standardized and geared to higher speeds—all without sacrifice in efficiency for the user—in an effort to keep pace with vital War Production demands.

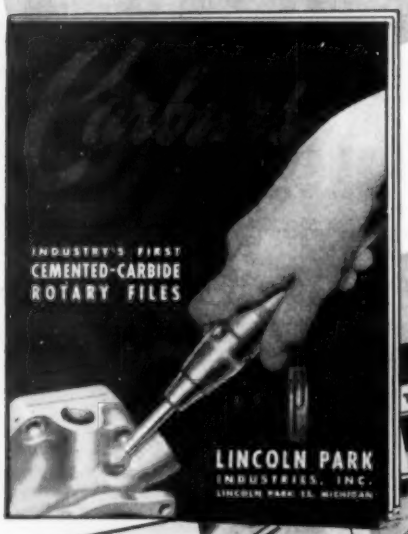
LANDIS REG. U.S. TRADE MARK PAT. OFF.

LANDIS MACHINE COMPANY
WAYNESBORO, PENNA., U. S. A.

THREADING MACHINERY—THREAD CUTTING DIE HEADS—COLLAPSIBLE TAPS

Now Carburs—INDUSTRY'S FIRST CEMENTED CARBIDE ROTARY FILES . . .

Carburs are now available in twelve standard shapes, each in from four to six different sizes and from fine to coarse cut—to meet almost any need. This new booklet contains illustrations and prices of all the standard tools now being produced. Write for your copy today.



Carburs have been put to almost every conceivable test, and from the results of these tests conducted in actual production it has been proved that Carburs offer at least fifty times the tool life of high speed rotary files. They provide a sharp cutting edge over a long period of time . . . reduce burring, filing or cutting time per part materially . . . and generally increase efficiency in these operations in all types of production.

ARMY E NAVY

LINCOLN PARK INDUSTRIES, INC.

Successor to The Lincoln Park Tool and Gage Company and Carbur, Inc.

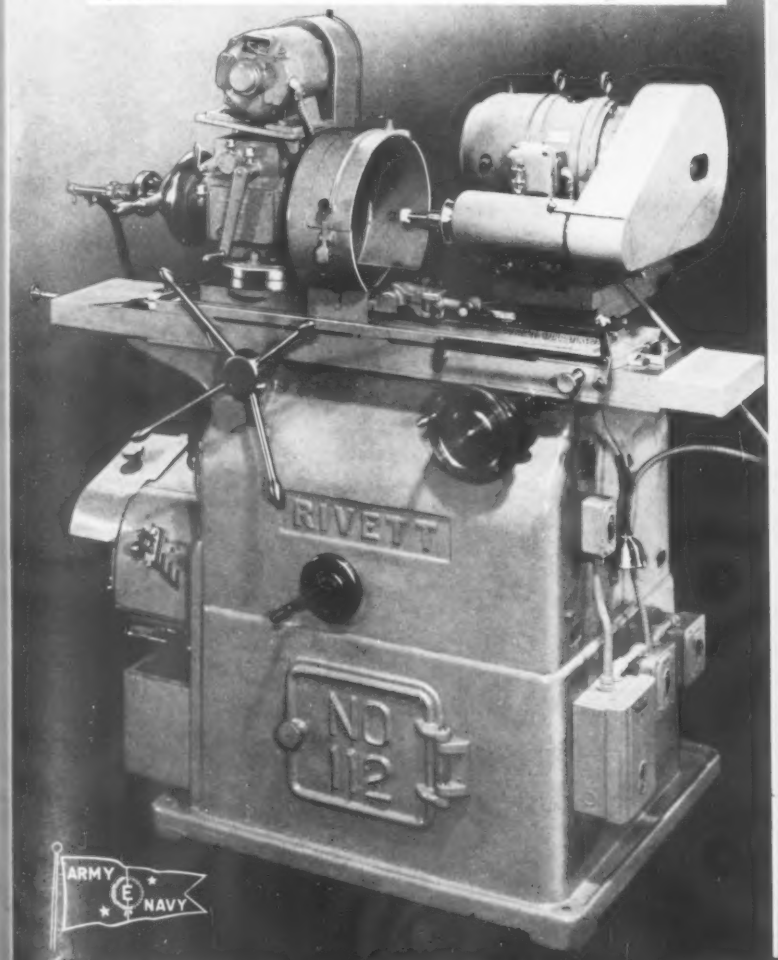
1725 FERRIS AVENUE • LINCOLN PARK 25, MICHIGAN

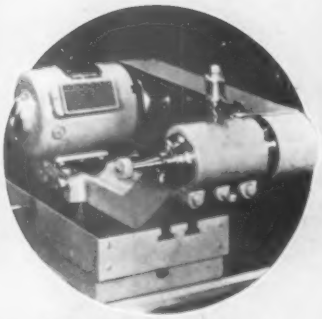
RIVETT

FOR STRAIGHT, TAPER, BEVEL OR STRAIGHT AND BEVEL GRINDING

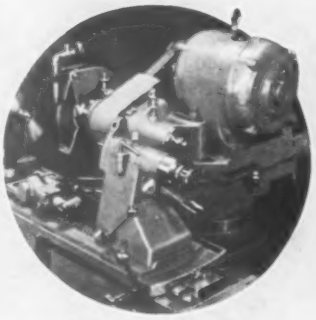
The Rivett No. 112 Universal Precision Grinder is primarily for tool-room work. Available internal and external spindles in combination with many adjustments make possible a great variety of grinding operations. Extreme simplicity of design enables any mechanic familiar with grinding to operate the machine.

Work may be held in collet, step chuck, jaw chuck or fixture and driven at required speed. Power table reciprocation may be set at one of eighteen selective speeds, from 10 to 86 passes per minute. Length of table travel is infinitely adjustable between ½" and 8". High or low speed internal bracket or external spindle bracket, all as illustrated, may interchangeably be mounted as required on cross slide. Workhead, table and cross slide are swivelled individually or in combination for taper and bevel grinding.





High Speed Internal Spindle



External Spindle and Tailstock

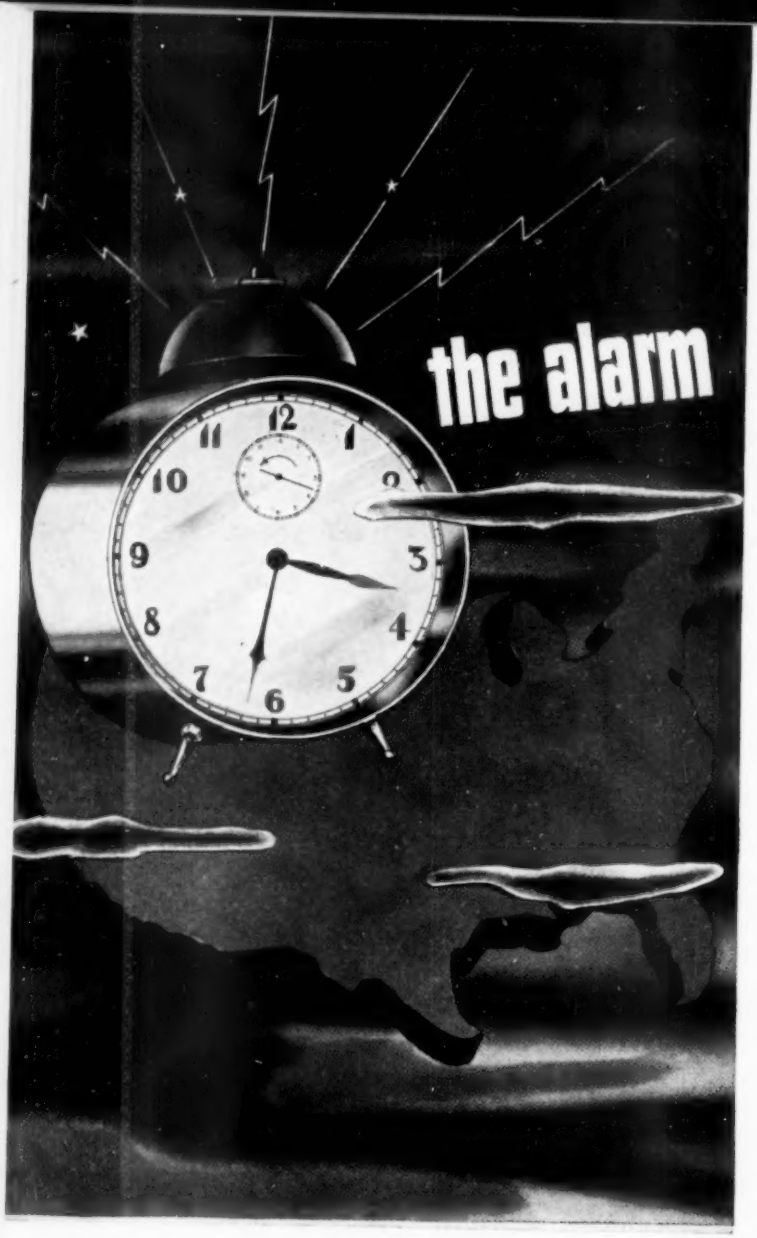
SPECIFICATIONS

Grinding cap., hole dia.	⅛" to 8"
Grinding cap., outside dia.	up to 8"
Automatic table travel	½" to 8"
Table speeds	18 selective
Hand table travel	16"
Swing over table	14"
Workhead swivel	90°
Table swivel	5°
Cross slide swivel	90°
Cross feed graduations	.0005"
Travel of cross slide	3½"
Collet capacity	1"
Step chuck capacity	8"
Jaw chuck capacity	8"
Workhead spindle speeds	150, 380, 600 r.p.m.
Grinding spindle speeds:	
Standard int.	4600 and 10000 r.p.m.
High speed int.	25000 r.p.m.
External	3300 r.p.m.
Automatic Oil Lubrication	
Net weight with motors	3700 lbs.

For Further Description Write for Bulletin 112

RIVETT LATHE & GRINDER INC.

BRIGHTON, BOSTON, MASS.



rang months ago!

At 3:32 A. M. Eastern War Time, June 6, 1944, the offi
announcement of the invasion of "Fortress Europe"
released by General Dwight D. Eisenhower. It marked
opening of the second front—the greatest event of all time
the beginning of the end of the war. It sounded the ala
for management to wake up and definitely plan for pe

To talk about postwar plans is not enough. Now is the t
for actual, factual planning and doing if private enterp
is to survive. *The alarm rang months ago.*

Now is the time to plan your new installations of machi
tools — to actually place your orders — to prepare for
day when you will have to supply more and more pe
time goods at lower cost.

LeBlond is making Tomorrow's Cost-Downing Lathes
day. A study of their exclusives and many other features
convince you that LeBlond's are the turning tools that
long in your "peace work" production program. Write to
for your copy of LeBlond Lathe Bulletins. Use the cou

THE R.K. **Le BLOND** MACHINE TOOL CO., CINCINNATI, 8

NEW YORK 13,
103 Lafayette St
CAnal 6-5281

CHICAGO 6,
20 N. Wacker Dr.
STA 5561

time to retool

Turn to Le Blond for Turning Equipment

LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES

ARMY E NAVY

LE BLOND

Check-Clip-Mail

FOR ILLUSTRATED SPECIFICATIONS:

- ☐ HEAVY DUTY GEARED HEAD ENGINE LATHES
- ☐ TOOL ROOM LATHES
- ☐ AUTOMATIC LATHES
- ☐ HEAVY DUTY GEARED HEAD GAP LATHES
- ☐ SUPER REGAL GEARED HEAD LATHES
- ☐ RAPID PRODUCTION LATHES
- ☐ AUTOMATIC CRANKSHAFT LATHES
- ☐ No. 2 CUTTER GRINDER

YOUR NAME _____ TITLE _____

YOUR FIRM _____ ADDRESS _____

★ YOUR BONDS BUY BOMBS ★

BUY A "BLOCK-BUSTER" TODAY!

HD Engine Lathes—Nine sizes ranging from 12" to 50" swings. For versatility in turning.

Automatic Lathes—12" & 16" Mechanical or Hydraulic power.

Super Regal Lathes—Six sizes, 13" to 24" Best for training.

Automatic Crankshaft Lathes—For all facing, turning, finishing, pins.

Tool Room Lathes—12", 14", 16" and 18" swings. Versatile.

HD Gap Lathes—Ten sizes in Regular and Sliding Gap models.

Rapid Production Lathes—13", 17", 20" swings. Six speeds. Faster output. Lower cost.

No. 2 Cutter Grinder—Internal, cylindrical, face and angular work.